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Literature references in [ ] refer to the *Review of Applied Mycology*.
Map references are to the C.M.I. distribution maps of plant diseases.

BONTEA (V[ERA]). **Putregaiul negru sau putregaiul uscat al Verzei.** [Black or dry rot of Cabbage.]—*Anal. Inst. Cerc. agron. Român.*, N.S., 22, 3 (*1952–3*), pp. 379–427, 9 pl., 6 figs., 6 graphs, 1955. [Russian and French summaries.]

Since its discovery in Romania for the first time in 1947 studies on the morphology and biology of the cabbage black rot agent *Phoma lingam* [map 73] have been conducted at the Institute for Agronomic Research with a view to discovering a reliable control method. The phytosanitary measures adopted since its appearance have restricted its occurrence to a few localities in the region of Bucharest, Ploeşti, Galaţi, Timişoara, and Cluj. Turnip-cabbage, white-heart cabbage, and cauliflower were the most susceptible and savoy and red cabbage less so, while radish was unaffected. Of the white cabbage varieties Spîna and Licurişca were the most susceptible, being subject to frequent and severe attacks. Chou de Buzau, Juni Riesen, and Copenhagen Market were also attacked frequently but less severely. The early varieties Minunea timpurülor, Prima recoltă, and Ditmark Treib suffered no losses even when the leaves were severely affected. In transmission experiments only four out of 49 wild crucifers developed infection, viz. yellow rocket (*Barbarea vulgaris*), dyer's woad (*Isatis tinctoria*), white mustard (*Sinapis alba*), and *Sisymbrium austriacum*.

The disease is transmitted by wind, water, insects, and animals, and through the seed. Control, therefore, consists in planting seed from healthy plants or disinfecting it if the source is unknown, either by immersion in hot water, which also destroys the mycelium within, or by a 30-minute soak in 0·1 per cent. corrosive sublimate [27, p. 343]. Seed-bed infection is prevented by treating the soil two weeks before sowing with a 1 per cent. solution of 40 per cent. formalin and roguing infected seedlings as they appear. Field control consists in destroying diseased plants, harvesting in autumn, and practising a three-year rotation. Seed infection is reduced markedly by planting the seed crop some distance from other cabbage crops during the first year and surrounding it by a 5 m.-wide barrier of a tall crop such as maize or sunflower.

RAYCHAUDHURI (S. P.) & PATHANIAN (P. S.). **A mosaic disease of Radish (Raphanus sativus L.).**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 99–104, 2 pl., 1956.

A mosaic of radish, first observed at the Indian Agricultural Research Institute, New Delhi, in 1951, is accompanied by necrosis and stunting. Inoculation experiments showed that the host range was confined to Cruciferae, other crops affected being oil-producing species of *Brassica*, in which it produced severe necrosis and death. The virus differs from radish mosaic in host range and properties, and from other viruses affecting the Cruciferae. It is not transmissible through seed. It survives at 85° C. (but not at 90°) for ten minutes, and withstands dilution to 1 in

10,000,000. It also withstands 17 days' storage at 17° to 22° and 101 days' storage at 6° to 8°.

NOLL (A.). **Untersuchungen an den durch Cercospora beticola auf Beta-Rüben hervorgerufenen Blattflecken.** [Studies on the leaf spots induced by *Cercospora beticola* on *Beta* Beets.]—*Phytopath. Z.*, 27, 4, pp. 467–472, 1 fig., 1 diag., 1956.

Previous observations by various workers on the spots produced by *Cercospora beticola* on beet leaves [8, p. 120; 11, p. 347; 35, p. 62, and next abstract] are extended and amplified by the author's comprehensive studies at the Institute for Resistance Testing, Brunswick, Germany.

The inspection of 50 beet selections revealed a correspondence between the external colour of the root and that of the outermost zone of the necrotic portion of the lesion. For instance, in red fodder varieties the surrounding zone was reddish, more rarely normal green, and in yellow ones nearly always yellowish, otherwise green, while in white (mostly sugar) varieties reddish or green marginal zones occurred in roughly equal proportions, with a few yellowish. In some cases the peripheral zones of the necroses presented an oily-transparent aspect which was maintained after complete desiccation of the leaf over a flame. Leaves of field plants occasionally displayed intensive variegation due to chlorophyll deficiency of unknown cause. *C. beticola* produced typical lesions in both the white and the normal green areas.

In the centre of the necrotic spots the chloroplasts were aggregated and in older lesions faded. In the next zone the chloroplasts were also aggregated but still green even in the older spots, while at the periphery, when recognizable, they appeared to be separate and discoloured brownish to blackish like the cell walls. Colourless, drop-shaped deposits, massive in places, were disclosed in the outer wall layers between the cells by infiltration with water (vacuum process).

When detached leaves, especially of young greenhouse plants, were rapidly yellowed in a moist chamber or boiled for about an hour in alcohol, a green border of varying width was left round the necrotic area. The inner layers of the cell walls of the living tissue were shown by Sudan III-glycerin to be suberized. In slightly diluted sulphuric acid the cell walls of the normal parenchyma were rapidly, and those of an adjacent fairly broad zone (with an outer boundary corresponding more or less to the green border) gradually dissolved. The cell walls of a mostly narrow ring in direct proximity to the necrotic area showed no sign of dissolution, while those of the lesions themselves were soluble to a varying extent. After 10 minutes' boiling in 50 per cent. potash lye (which destroyed the suberin), followed by one minute in aniline blue-acetic acid and rinsing in water, the cell walls of the acid-resistant living tissue zone were stained bright blue, while those of the remaining tissue in and outside the vicinity of the lesion were absolutely colourless. In resistant varieties the blue-staining zone very often appeared broader in relation to the corresponding mycelial extension than in susceptible ones, and sometimes the coloration was deeper. There was little or no staining of freshly infected tissue, and it was frequently absent in dense single foci involving necrosis of large, continuous areas of the leaf surface, as well as in detached leaves, on which the fungus developed in a moist chamber following inoculation or natural field infection.

Placed in a moist chamber leaves of outdoor plants turned brownish in the course of about a week without obvious signs of wilting. The discoloration did not, however, involve the halo surrounding the lesions. Stained by the above-mentioned procedure, the discoloured areas were seen to be permeated by the bluish hyphae of an evidently extraneous fungus which did not occur in the normally coloured halo and has not yet been identified.

Some of the findings here reported are analogous to those described in connexion with *Puccinia* spp. on cereals [34, p. 292].

Reggelin (H.). **Das Kalium/Natrium Verhältnis im Zellsaft von Zuckerrüben. Ein Beitrag zum Studium der Stoffwechselstörungen von virösen und Cercospora-infizierten Rüben.** [The potassium/sodium ratio in the cell sap of Sugar Beets. A contribution to the study of metabolic disturbances in virus- and *Cercospora*-infected Beets.]—*Z. Zuckerind*, N.S., 6, 7, pp. 359–362, 1 graph., 1956. [English and French summaries.]

At the Research Institute of the Kleinwanzleben Plant Breeding Company, Einbeck, Germany, the proportions of potassium and sodium in raw sugar beet sap are determined by means of a flame photometer and the ratio of the former to the latter is calculated. The potassium-to-sodium quotient virtually parallels that of polarization and is strongly depressed by separate and combined infection with mosaic and yellows viruses [see next abstract] and *Cercospora* [*beticola*: 36, p. 78 and preceding abstract]. The quotient is diagnostic for the severity of the diseases and furnishes a clue as to the increment of molasses to be expected. For 'standard', early- (virus) infected, and late-infected beets the potassium oxide to sodium oxide ratios were 6:15, 4:35, and 5:26; the polarization 18·3, 15·9, and 16·5; and molasses increment 0, 44, and 14 per cent., respectively. Previous inoculation with the viruses enhanced susceptibility to leaf spot, and a combination of viruses was more injurious than yellows alone.

Lüdecke (H.) & Neeb (O.). **Ertrag und Beschaffenheit der Zuckerrübe bei kombinierter Infektion mit Vergilbungs- und Mosaikvirus.** [Yield and composition of the Sugar Beet in combined infection with yellows and mosaic virus.]—*Z. Zuckerind.*, N.S., 6, 12, pp. 630–633, 1956. [English and French summaries.]

A comparative inoculation experiment at the Sugar Beet Research Institute, Göttingen, Germany, to determine the influence of the beet yellows and mosaic (with variants) [35, p. 570] viruses, separately and combined [see preceding abstract], on the yield and composition of sugar beets yielded the following results. The influence of the two viruses was largely homogeneous. Both reduced beet, foliage, and sugar yields, polarization, sugar content of the leaves, and dry matter content of beets and foliage, while simultaneously increasing 'noxious' nitrogen [36, p. 78] and ash. In contrast to experience in Czechoslovakia [30, p. 553] and Bulgaria (*Rev. Inst. Rech. agron. Bulg.*, pp. 89–100, 1950), mosaic alone caused inconsiderable losses (6, 10, and 9 per cent., respectively, of beets, foliage, and sugar) notwithstanding early inoculation (21st to 22nd June). The beet yield reduction from yellows virus was nine times heavier than that due to mosaic.

In general, the beet losses resulting from mixed infection approximated to the sum-total of the quantitative and qualitative depreciations due to both viruses separately. In the case of the foliage, however, the principle of summation applies only to calculations based on fresh and not on dry weight.

Čamprag (D.) & Matić (I.). **Utvrđivanje optimalnog broja prskanja u suzbijanju pegavosti lišća Šećerne Repe.** [Determination of the optimum number of sprays in the control of leaf spot of Sugar Beet.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1956*, 33, pp. 3–16, 1956. [English summary.]

In 1954 and 1955 trials were carried out at the Institute for Sugar Beet Selection, Crvenka, Vojvodina, Yugoslavia, to determine the number of sprays required for the control of leaf spot (*Cercospora beticola*) of sugar beet [35, p. 91]. Two and three applications at 15- to 16-day intervals of 2 per cent. Bordeaux mixture (5 kg. copper per ha.) or 0·8 per cent. copper-oil (4 kg.) during the period between 1st of July and 18th of August successfully controlled the disease, reducing infection from 3·45 to 1·23 and 0·68 per cent., respectively, with Bordeaux mixture, and 1·35 and 0·88 per cent., respectively, with copper-oil, in the very rainy summer of 1955.

Increasing the number of sprays to four and five in 1955 did not influence the preservation of the foliage, largely because of the insufficient insolation and lower average temperatures during the summer.

Čamprag (D.). **Neka zapažanja o pojavi i štetnosti žutice na Šećernoj Repi u našoj zemlji.** [Some observations on the appearance of and damage caused by yellows in Sugar Beet in our country.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1956*, 35, pp. 23–35, 1956. [English summary.]

Sugar beet yellows virus [34, p. 424], widespread in all the sugar beet growing districts of Yugoslavia, causes serious losses every year in both industrial and seed sugar beets (amounting to three milliard dinars in a year of heavy infection). In August and October, 1955, root yields were reduced by the disease from 22·5 and 55·2 kg. [per ha.] to 17·9 and 46, respectively; foliage yields from 46·2 and 28·7 to 41·3 and 24·9; and sugar yields from 2·63 and 8·17 to 2·18 and 6·53.

Improving the agricultural methods to obtain optimum conditions for sugar beet development, including an increase in the number of plants to about 80 to 90 thousand per ha. [cf. 35, p. 741] and controlling the aphid vector (*Aphis fabae*), which is prevalent during May, June, and July, should greatly lessen disease incidence.

Nikolić (V. J.). **Prenošenje virusa žutice Šećerne Repe semenom.** [Transmission of Sugar Beet yellows virus by seed.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1956*, 35, pp. 79–82, 1956. [English summary.]

Experiments at the Institute of Plant Protection, Beograd, Yugoslavia, from 1953 to 1954 showed that sugar beet yellows virus [see preceding abstract] can be transmitted by seed, four (0·1 [? 0·2] per cent.) of a total of 2,064 seedlings from both healthy and infected sources developing typical yellows symptoms. Including plants showing probable but not definite yellows symptoms, the percentage of infected seedlings was 1. These results corroborate those of Pozdena *et al.* in Czechoslovakia (*Zborn. ČAZ*, 27, 4, 1954).

Doepel (R. F.). **Downy mildew of Onions.**—*J. Dep. Agric. W. Aust.*, Ser. 3, 5, 2, pp. 185–186, 189–190, 4 figs., 1956.

In a further spray trial against downy mildew (*Peronospora destructor*) of onions [35, p. 807] carried out in Western Australia the value of zineb was again evident, resulting in yields of 53 lb. per plot as opposed to 43 with copper oxychloride or untreated. Zineb with the addition of triton B 1956 reduced the percentage of seed stalks affected from 56·9 (untreated) to 6·5.

Grogan (R. W.) & Zink (F. W.). **Fertilizer injury and its relationship to several previously described diseases of Lettuce.**—*Phytopathology*, 46, 8, pp. 416–422, 1 fig., 1956.

Characteristic symptoms of a disorder that has caused considerable damage of late years to commercial lettuce plantings in the Salinas Valley of California include wilting of the leaves (sometimes only those of the outer frame), which assume a dull, dark or grey-green tinge and may develop yellow, V-shaped sectors, tending to become necrotic. Rootlets, larger lateral roots, and sometimes the tap-root may be killed, but as a rule the longer roots merely exhibit partial or total yellowing or browning, with cracking and cork formation, frequently associated with a yellow, red, or brown discoloration of the stele. In severe cases the xylem tissues may collapse, the resultant cavity sometimes extending into the crown.

The foregoing symptoms were reproduced in greenhouse trials by the application to the roots of Great Lakes lettuce plants of synthetic nitrogenous fertilizers, of

which ammoniated ammonium nitrate and sodium nitrite were considerably more toxic than urea, ammonium sulphate, or calcium nitrate, the first-named causing marked discoloration and injury of the xylem core at rates of 50 and 100 lb. per acre. The same quantities of phosphoric acid induced a comparable breakdown of the internal root tissues and necrotic flecking of the older leaves. The roots were similarly damaged by treatment with chicken manure at rates between 2 and 16 tons per acre. In all field experiments liquid ammoniated ammonium nitrate solution at dosages of 40 to 320 and aqua ammonia solution at 80 to 320 lb. per acre were the most injurious of five common nitrogenous fertilizers tested in soils varying from sandy loam to clay. Ammonium sulphate and calcium nitrate were again relatively innocuous, though both caused typical root damage at the higher rates of 160 and 320 lb. per acre, especially after the lapse of 43 days, when the final inspection was made. However, the increase in the extent of injury developing with the lapse of time after application was most pronounced with urea at the same rates, possibly owing to the production of breakdown products under the influence of microbial or chemical action in the soil.

The similarity of the symptoms here reported to those of various previously described diseases of lettuce, e.g., bacterial rosette (*Pseudomonas rhizoctonia*) [2, p. 445], brown stele [35, p. 573], and root rots attributed to *Pythium* sp., suggests that the same basic cause, i.e., damage to the root system by ammonia or other toxic nitrogenous materials, such as nitrite, may be operative in all. From a list of 31 references many relevant accounts of similar fertilizer injury and the production of toxic nitrogen are quoted.

HILDEBRAND (A. A.). **Observations on stem canker and pod and stem blight of Soy-beans in Ontario.**—*Canad. J. Bot.*, 34, 4, pp. 577–599, 2 pl., 2 graphs, 1956.

The most serious disease of soy-beans in Ontario is stem canker caused by *Diaporthe phaseolorum* var. *caulivora*, the symptoms of which are described [34, p. 273]. Inoculation experiments showed that soy-beans susceptible to the disease (which includes all commercial varieties in Ontario) become less so as they mature, reduction in yield being correlated with earliness of infection. Six weeds tested, together with tomato, [chilli] pepper, snap bean [*Phaseolus vulgaris*], and field broad bean were not susceptible. Although *D.p.* var. *caulivora* is seed-borne infection from this source is not of primary importance, but a search for other hosts was unsuccessful, as the fungus apparently overwinters on diseased plant parts left after harvest, though evidence suggests that the pathogen may originally have been indigenous to the soil. In the field the varieties Harman and Harosoy show a consistently lower incidence of stem canker than other commonly grown varieties, such as Hawkeye and Blackhawk.

The pod and stem blight organism, *D.p.* var. *sojae* [34, p. 126], is present in Ontario mostly in the *Phomopsis* state, and is of negligible economic importance.

RAMAKRISHNAN (T. S.) & SAROJINI DAMODARAN (A. P.). **Root rot of Chilli and its control.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 204–205, 1 fig., 1956.

In fungicide tests for the control of root rot (*Sclerotium rolfsii*) of chilli (*Capsicum annuum*) [cf. 6, p. 390], which has been prevalent at fruiting time in the Coimbatore area of India of recent years, there was no mortality in potted plants in inoculated soil treated with ceresan, as against 90 and 88 per cent. in soil given Cheshunt compound or Bordeaux mixture, respectively. Ceresan was also highly efficient in the field; ½ pint of 0·1 per cent. solution per plant, recommended to farmers, was effective as a preventive only, and repetition may be necessary after two or three weeks.

Cox (R. S.). **Verticillium wilt of Eggplant in south Florida.**—*Plant Dis. Reptr*, 40, 6, p. 583, 1956.

Verticillium albo-atrum was reported causing wilt of eggplants for the first time in the State on the organic and adjacent mineral soils of south Florida in 1954 and 1955 [cf. 35, p. 506]. It is stated to be more serious on the muck soils adjacent to Lake Okeechobee than on the sandy soils along the east coast, resulting in yield reductions of up to 75 per cent. in the former area. The fact that 80 per cent. infection was recorded in a 2-acre planting of the variety Florida Market (Cook's strain) grown on land not cropped with chilli or eggplant for at least 15 years indicates that the disease originated in seed [14, p. 283].

Das (C. R.) & Chattopadhyay (S. B.). **Bacterial wilt of Eggplant.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 130–135, 1956.

The agent of a disease of eggplant new to West Bengal which attacks flowering plants from May to October and is most destructive in years of heavy rainfall, has been identified at the State Agricultural Research Institute, Calcutta, as *Pseudomonas solanacearum* var. *asiaticum* [cf. 33, p. 576]. It can survive for 16 months in soil and for nine in diseased plant remains. It attacked also potato, tomato, and tobacco in tests.

Saksena (H. K.) & Prasada (R.). **Studies in grain rust, Uromyces ciceris-arietini (Grogn.) Jacz.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 94–98, 1956.

Studies at the Indian Agricultural Research Institute, New Delhi, showed that gram [*Cicer arietinum*] rust (*Uromyces ciceris-arietini*) [27, p. 110] does not oversummer in the uredostage in the plains, but may do so in the hills, where *Trigonella pulcerata*, which is widespread up to 6,000 ft., was shown by cross-inoculation tests to be a collateral host. Dissemination probably occurs from the hills to the plains, where there is apparently no local source of infection.

Joshi (N. C.). **An undescribed disease of Anethum graveolens (Peucedanum graveolens B. & H.).**—*Sci. & Cult.*, 22, 3, pp. 168–169, 1956.

A powdery mildew, probably a species of *Oidium*, not previously recorded on dill [cf. 18, p. 616] in India, caused serious damage to this crop in March, 1956, in the vicinity of Ajmer. A spray application of 25 lb. of sulphur per acre gave good control.

Réal (P.). **Sur la maladie de la rosette de l'Arachide.** [On rosette disease of Groundnut.]—*Agron. trop., Nogent*, 11, 5, pp. 638–645, 1 diag., 2 graphs, 1956. [English and Spanish summaries.]

As there seems to be some vagueness about what exactly constitutes rosette virus disease of groundnuts [36, p. 163], the author reviews and discusses the available information on the symptoms, the incubation period of the virus (14 to 17 days locally in tests), the manner in which the host reacts to infection according to its age, the genetic factors involved in resistance, and the effect of climatic factors on the disease. Conditions which may be confused with rosette disease are: absence of bacterial root nodules (a deficiency common in North Africa); attack by the capsid *Halticus minutus*, probably causing the condition referred to as 'green rosette' in the Belgian Congo [19, p. 386]; the widespread 'clump' or chlorophyll deficiency, resulting from high pH on soils rich in potassium, the symptoms of which appear in less than 15 days; and mosaic-like variegation, of no importance and easy to distinguish because of the normal aspect of the plant.

The greatest reduction of yield occurs when the plant is attacked by the vector (*Aphis leguminosae*) [*A. craccivora*] at some time between the third and seventh

weeks of its growth, if the variety reaches maturity within 100 days. In general, plants best adapted to the local climatic conditions in any area are the most resistant. The disease does not appear to occur in every region where *A. craccivora* is present.

ATKINS (F. C.). **The diagnosis of mummy.**—*M.G.A. Bull., 1956*, 74, pp. 44–46, 1 fig., 1956.

In this brief, popular account of 'mummy' disease of mushroom [34, p. 127], the author lists the 13 characteristics given by Kligman (Handbook of Mushroom culture, 1950), together with the additional ten previously recorded by Tucker and Routien [cf. 23, p. 54], and suggests a consolidated list of seven which are sufficient for the recognition of the disease.

Some notes on truffle.—*Mushroom News* (W. Darlington & Sons, Ltd., Worthing, Sussex), 5, 8, p. 156, 1956.

These notes recapitulate previously published information on truffle disease [*Pseudobalsamia microspora*: 32, p. 467; 34, p. 571] of mushroom and its control. Mushroom growth in already infected beds can be encouraged by dusting with superphosphate at 4 oz. per sq. yd. Germination of truffle spores is best avoided by delaying spawning until the bed temperature has dropped below 65° F. and by spraying the compost, at the last turn or at filling, with copper sulphate solution at $1\frac{1}{2}$ lb. in 10 gals. per ton of manure.

WOOD (F. C.). **Peak heating. Some practical considerations.**—*Mushroom News* (W. Darlington & Sons, Ltd., Worthing, Sussex), 6, 2, pp. 186–187, 1 fig., 1956.

Heavy production of inkcaps (*Coprinus atramentarius*) [14, p. 345] was observed on certain mushroom farms where coke braziers were used for peak heating, incidence being highest in the areas of most intense heat. On one farm the average bed temperature at peak heating was 135° to 140° F., while that of the areas affected by the braziers was 145° to 150° [cf. 32, p. 59], the average pH readings of the compost being 7·6, and 8·0 to 8·2, respectively. It is concluded that a minimum number of braziers should be used.

WILLIAMS (L. E.) & LOCKWOOD (J. L.). **Control of bacterial wilt of Cucumber by antibiotic sprays.**—*Plant Dis. Reptr*, 40, 6, pp. 479–482, 1956.

The effect of antibiotic spray applications on the incidence of bacterial wilt (*Erwinia tracheiphila*) of cucumber [31, p. 418] was studied at the Department of Botany and Plant Pathology, Ohio Agricultural Experiment Station, Wooster. In the greenhouse, 100 p.p.m. streptomycin or neomycin and 500 p.p.m. terramycin or penicillin applied 24 hours before inoculation by leaf-rubbing reduced the disease incidence from 21 (out of 30) diseased plants (untreated) to 8 or 2 and 3 or 10, respectively. Applications of 500 p.p.m. streptomycin or neomycin gave complete control. In the case of hypodermic injection inoculations 100 p.p.m. streptomycin or 500 p.p.m. terramycin reduced the disease from 25 diseased plants (out of 30) for the untreated to 17 and 16, respectively. In the field sprays containing 100 p.p.m. streptomycin and 200 p.p.m. terramycin also reduced the incidence of the disease. Plots sprayed with 500 p.p.m. streptomycin produced yields 25 per cent. higher, e.g. 479 lb. as against 357 lb. for the untreated.

Report of the Overseas Food Corporation for 1954–55.—183 pp., 8 pl., 4 diags., 1 map, 1956.

In the section of this report dealing with scientific and experimental work of the

Overseas Food Corporation in three development areas in Tanganyika (pp. 101–148) it is stated that groundnut varieties with dark green foliage and a long season growth period possess the best resistance to the two important leaf spot diseases, *Cercospora* [*Mycosphaerella*] *arachidicola* and *C. personata* [*M. berkeleyii*: 35, p. 661]. The resistant Asirya Mwitunde is grown extensively and fungicide research is now unnecessary.

Damage to maize crops by *Puccinia polysora* [35, p. 589] was high; badly diseased crops yielded 1,800 lb. per acre compared with 2,700 lb. from lightly diseased crops dusted with sulphur.

The three main diseases affecting sorghum are rust (*P. purpurea*) [34, p. 364], downy mildew (*Sclerospora sorghi*) [loc. cit.], and covered smut (*Tolyposporium ehrenbergii*) [loc. cit.].

Losses up to 75 per cent. due to *Aspergillus niger* and a *Rhizopus* sp. occurred in seedling sunflowers at Urambo in 1951.

THERMAN (EEVA). **Development of the crown gall.**—[Abs. in] *Acta chem. fenn.*, B 29, p. 106, 1956.

Studies at the Botanical Institute of the University of Helsinki on the cells in broad bean stems inoculated with *Agrobacterium tumefaciens* substantiate other findings [35, pp. 662, 881]. Diploid cells begin to divide after two days and form meristem-like tissue. The tetraploid cells then divide and form a cortex-like layer round the diploid. Cells up to 32-ploid appear at various mitotic stages, some polyploid divisions showing large bundles of chromatids. All cells except the giant ones become lignified in mature galls.

FROSHEISER (F. I.). **Storing inoculum of Pseudomonas glycinea in host tissue by freezing.**—*Phytopathology*, 46, 9, p. 526, 1956.

A method is described from the Institute of Agriculture, University of Minnesota, St. Paul, whereby freshly gathered soy-bean leaves infected with *Pseudomonas glycinea* [35, pp. 66, 652] were stored in plastic bags at −18° C. for some 10 months and then used as a source of active inoculum of the pathogen, which tends to lose virulence in agar.

CARMONA-GOMEZ (J.). **In vitro development of resistance to an antibiotic by two plant pathogenic bacteria.**—*Phytopathology*, 46, 9, pp. 522–523, 1 fig., 1 graph, 1956.

At Cornell University, Ithaca, New York, strains of *Xanthomonas phaseoli* var. *fuscans* [32, p. 5] and *X. vignicola* [31, p. 45] were developed in which resistance to the antibiotic A-6 (Wyeth Laboratories, Inc.) [34, p. 388] was considerably increased by subculturing through a series with increasing A-6. At each step inoculum was taken from the highest concentration at which bacterial growth was readily visible [cf. 34, p. 101].

The initial maximum tolerations, 0·75 μg. per ml. for *X.p.* var. *fuscans* and 3 μg. for *X. vignicola*, were increased in eight and nine transfers over a period of ten weeks to 300 and 400 μg., respectively, or 400 and 133 times the initial tolerant level.

Sixth Conference of the Inter-American Technical Cacao Committee, 1956.—*Cacao* (*Int.-Amer. Cacao Cent.*), 3, 11, pp. 9–23, 5 figs., 1956.

Abstracts are given of papers presented at the above conference, held at Salvador, Bahia, Brazil, in May, 1956 [cf. 34, p. 353]. Some of the information therein has already been noticed from other sources. In an account of the status of research on *Phytophthora* pod rot (*P. palmivora*) [35, p. 883] of cacao R. G. ORELLANA

(p. 9) suggests that the strains of the fungus on cacao be designated var. *theobromae* and those on *Hevea* rubber var. *heveae*. Apparently Criollo cacaos are highly susceptible to both the pod rot and canker caused by the fungus, whereas the Forastero complex is susceptible to pod rot but resistant to canker.

R. Desrosiers (p. 10) discussed the control of witches' broom [*Marasmius perniciosus*: 35, p. 882], pod rot due to *Monilia* [*roreri*: loc. cit.], and trunk canker caused by *Ceratostomella* [*Ceratocystis fimbriata*: 33, p. 593], the three most serious cacao diseases in South America. He suggested that the resistance to *Marasmius perniciosus* in Forastero and Trinitario clones is associated with resistance to *C. fimbriata*.

In a discussion of witches' broom in South America and the West Indies and its control B. G. Montserin and L. L. de Verteuil stated (p. 13) that a few of the cacao introductions from South America into Trinidad [34, p. 775] to combat the disease were immune but commercially unsuitable, and several were resistant. Crossing with selected Trinitario [35, p. 4] was begun in 1949, and of 559 F_1 seedlings, 21 had as yet shown no signs of the disease. The best of these are to be back crossed with non-resistant heavy bearers.

The results of spraying trials in Costa Rica against *P. palmivora* by R. G. Orellana and L. R. Siller [35, pp. 430, 514] (pp. 14–15) lead to the conclusion that Bordeaux mixture applied five or six times a year, coupled with frequent harvesting, gives the greatest yield increases. R. G. Orellana and C. Bianchini reported (p. 14) that Bordeaux mixture, perenox, and crag applied at monthly intervals over two years achieved almost complete eradication of *Pellicularia* thread blight [*Corticium koleroga*: 35, p. 883]. Phygon was not effective. R. G. Orellana (p. 15) drew attention to the relation between the nitrogen content of the leaves of young cacao plants, light incidence, and their infection by *Phytophthora palmivora*. W. T. Lellis and E. A. T. de Matta reported that copper Sandoz (0·4 per cent.) gave better control of *P. palmivora* pod rot than cuprosan (0·5 per cent.) or dithane Z-78 (0·4 per cent.), owing to its adhesive properties. At 0·1 per cent. it totally inhibited growth of the fungus on potato dextrose liquid and agar. The first author also found that seedling cacao, sprayed with a spore suspension of *P. palmivora*, developed more foliar lesions in direct sunlight than in shade, especially after being covered at night, when spore germination occurred, increasing the number of lesions.

R. Desrosiers and J. Diaz reported (p. 16) that pods are more susceptible to *Monilia roreri* [35, p. 359] when young; pod colour was immaterial, but shading decreased infection. They also gave a brief account of the world distribution of seven cacao diseases.

G. Malaguti discussed (p. 16) the trunk necrosis disease (*Ceratocystis fimbriata*) in Venezuela and its control [33, p. 144]. Criollo strains are more susceptible than Forastero.

Recommendations were made under the chairmanship of R. G. Orellana (p. 20) for a suitable quarantine service to ensure essential movement of cacao planting material while guarding against the spread of diseases (*Marasmius perniciosus*, *Monilia roreri*, and viruses). Movement is to be unrestricted from areas without these diseases, barred from West Africa, and quarantined from elsewhere.

Recommendations were also made, under the chairmanship of R. Desrosiers (p. 21), concerning fungicidal control of cacao diseases. Investigation of low gallonage application, possibly at more frequent intervals, was called for, together with the need for standardization of trial methods and the augmented collection of relevant environmental data relating to disease incidence. The threat of *C. fimbriata*, the need to investigate its possible pathogenicity to cacao when isolated from other hosts, and the role of associated insects were stressed.

Virtanen (A. I.), Hietali (P. K.), & Wahlroos (O.). **An anti-fungal factor in Maize and Wheat plants.**—*Acta chem. fenn.*, B 29, p. 143, 1956.

An anti-fungal factor, apparently a methoxyl derivative of 2 (3)-benzoxazolinone [35, p. 821], was isolated at the Biochemical Institute, Helsinki, Finland, from young maize and wheat plants. At a concentration of 1 in 3,000 it inhibited the growth of *Fusarium nivale* [*Calonectria nivalis*: loc. cit.].

Jørstad (I.). **Svartrustproblemet i Norge.** [The black rust problem in Norway.]—*Nord. JordbrForskn.*, 36, pp. 223–226, 1954. [Received November, 1956.]

Information is presented on the geographical distribution of *Puccinia graminis* in Norway [30, p. 602] in connexion with the epiphytotic of 1951 on spring wheat, the severity of which was unprecedented in the 70 years' history of cereal disease observations in the country. In general, wheat appears to be the least and oats the most susceptible of cereals to black rust. Possible reasons for the outbreak are discussed, including the prevalence of southerly winds during August, which may have carried uredospores of an unusual physiologic race from the south of Sweden [32, p. 306] and the Danish islands [32, p. 244] to the eastern districts where the losses were heaviest. It is concluded that the epiphytotic was an isolated event precipitated by an unaccustomed conjunction of various adverse factors and not associated, at any rate in Norway, with an increase in barberry cultivation.

Joshi (L. M.) & Kak (D.). **Mutation in Puccinia graminis tritici (Pers.) Eriks. & Henn., physiologic race 194.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 202–204, 1956.

In 1954, at the Indian Agricultural Research Institute, New Delhi, a pustule of race 194 of *Puccinia graminis tritici* [26, p. 293; 33, p. 415; 35, p. 172], which was first isolated from a wheat collection at Madhya Bharat, India, in 1945, was yellow at the edges. The spores there were different in size and colour. One culture passed unchanged through 11 generations in eight months but when, after ten months, single spore cultures were established, it was discovered that there were two mutants, both of which remained consistent through six generations. For both mutants the incubation period was nine days at 15° to 25° C., compared with eight days for the parent strain, and the 28-day-old uredospores of mutant 1 were deep chrome and measured 25 by 17 μ, while those of mutant 2 were mars yellow and 28 by 18 μ. Neither mutant differed appreciably from the type race in pathogenicity.

Nelson (R. R.). **Transmission of factors for urediospore colour in Puccinia graminis var. tritici by means of nuclear exchange between vegetative hyphae.**—*Phytopathology*, 46, 10, pp. 538–540, 1956.

Further studies at the University of Minnesota, St. Paul, on hyphal fusions between races of wheat stem rust (*Puccinia graminis*) [35, p. 596] involved mixtures of red-brown race 11 and grey-brown race 121 on the variety Little Club, susceptible to both, and on Vernal emmer, resistant to 11 and susceptible to 121. One such mixture gave an orange biotype virulent on Vernal, which after six uredial generations had resolved into red-brown or grey-brown dissociants, the latter identical with the parent race 121. Thirty red-brown dissociants were intermediate in virulence between the parents, and two exceeded them. The orange isolates finally obtained did not dissociate further. Less than 1 per cent. of these were trinucleate, but they continued to be produced as long as the isolate gave coloured dissociants. The parent type and the red-brown and grey-brown dissociant uredospores were all binucleate and did not dissociate.

The possible implications inherent in the production of the orange pustule on

Vernal are discussed in detail. The production of a more virulent dicaryotic dissociant than either parent biotype indicates that genes for increased virulence on a given host may be expressed when placed in proper combination.

Van der Zaag (D. E.). **Gele roest op Joncquois Tarwe in de jaren 1935–1940.** [Yellow rust on Joncquois Wheat in the years 1935 to 1940.]—*Tijdschr. PlZiekt.*, 62, 5, pp. 258–260, 1 graph, 1956. [English summary.]

The first severe outbreaks of yellow rust (*Puccinia glumarum*) on Heines winter wheat in the Netherlands [34, p. 440] during 1955 resulted not infrequently in yield reductions of 10 to 20 per cent. In this connexion it is recalled that the French variety Joncquois, which was highly productive in 1935 and 1936, sustained such heavy damage from the same pathogen in 1937 and 1938 that it soon disappeared from experimental plots in Gröningen and Zeeland and was not included in the Descriptive List of Varieties for 1940.

Konzak (C. F.), Borlaug (N. E.), Acosta (A.), & Gibler (J.). **Stripe rust resistant mutants obtained from irradiation of Gabo Wheat.**—*Phytopathology*, 46, 9, pp. 525–526, 1 fig., 1956.

At Brookhaven National Laboratory, Upton, New York, seed of the Australian wheat Gabo (widely grown in Mexico but very susceptible there at high altitudes to *Puccinia glumarum*) [34, p. 218] was irradiated in 1953 with doses of 15,000r of X-rays or about $2{\cdot}3 \times 10^{12}$ Nth/cm^2 thermal neutrons to induce rust resistance in the progeny. One N_3 line bred true for a high degree of resistance, while otherwise resembling Gabo, and 12 other resistant progenies were obtained, though non-irradiated lines produced none. The true-breeding of resistance in the N_3 suggests recessive inheritance for the mutation. The procedure is considered to hold promise for plant breeding generally.

Hsi (C. H.). **Dryland root rot of 1954–55 winter Wheat in eastern New Mexico.**—*Plant Dis. Reptr*, 40, 5, pp. 361–363, 1 fig., 1956.

Dryland root rot, affecting winter wheat throughout the growing season, was widespread in three consecutive years in all major wheat-growing sections of eastern New Mexico [33, p. 596]. In 1955 the disease was more severe than in the previous years and in extreme cases killed the plants at early stages of growth. Sowing in late August and September, 1954, when high soil temperatures were conducive to disease development, the autumn epidemic of leaf rust (*Puccinia rubigo-vera tritici*) [*P. triticina*], which weakened the plants, and the severe drought during most of the growing season all predisposed the plants to attack by root rot fungi. Isolates from diseased plants included *Helminthosporium sativum* [*Cochliobolus sativus*], found in 82 of the 94 fields surveyed from October to June, *Rhizoctonia* [*Corticium*] *solani* (71), *Curvularia* spp. (36), and *Fusarium* spp. (16).

Meiners (J. P.). **Transfer of dwarf bunt from Wheat to Slender Wheatgrass and from Rye to Wheat.**—*Plant Dis. Reptr*, 40, 4, pp. 347–348, 1956.

At Pullman, Washington, slender wheat-grass (*Agropyron trachycaulum*) and Orin wheat were inoculated with dwarf bunt (*Tilletia controversa*) [35, p. 759; 36, p. 93] from Orin wheat by keeping a mixture of spores and soil (Palouse silt loam) in Petri dishes out-of-doors during mid-winter until the spores germinated. Seeds were then placed on the soil surface, the lid replaced, and the plates kept inverted until the shoots were 1 to 2 in. long. The seedlings were eventually transplanted to the field. This was the first case of a grass being found susceptible to dwarf bunt by inoculation.

The nature of the occurrence of dwarf bunt on rye in the Pacific Northwest

indicates a relationship with the dwarf bunt on wheat. Infection appeared on one plant of the wheat variety Hybrid 128 grown from seed inoculated with pre-germinated spores of dwarf bunt from rye; however further evidence is required [cf. 35, p. 434].

Niemann (E.). **Taxonomische und keimungsphysiologische Untersuchungen an Tilletia-Arten von Getreide und verschiedenen Wildgräsern.** [Investigations into the taxonomy and the physiology of germination of *Tilletia* species from cereals and various wild grasses.]—*Angew. Bot.*, 30, 4–5, pp. 135–140, 1956.

At the Biologische Bundesanstalt, Kiel-Kitzeberg, Germany [cf. 35, pp. 436, 597], the spores of *Tilletia foetida* and *T. caries* from various sources all germinated at both 3° and 15° C., whereas those of *T. controversa*, rye bunt [*T. secalis*], and *T.* spp. from various grasses germinated at the lower temperature only. The last-named, including one from *Agropyron repens*, the type host of *T. controversa*, were like dwarf bunt in germinating only (or better) in the light [34, p. 358]. Passage of the fungi in cereal hosts other than those from which they were isolated had no effect on the temperature at which the spores germinated.

These studies support the view that dwarf bunt of cereals originated from wild grasses [see preceding abstract].

Melchers (L. E.), King (C. L.), & Hansing (E. D.). **A forty-two year history of bunt in Kansas and a long-time program of control.**—*Plant Dis. Reptr*, 40, 6, pp. 493–499, 1 graph, 1956.

In this partly tabulated account of the history of wheat bunt (*Tilletia foetida*) [35, p. 756] in Kansas its control since 1914 is reviewed. The average annual loss for the first 21-year period (2·6 per cent.) was reduced in the second to less than 0·25 per cent., and that of 3·7 in the first ten-year period to 0·14 in the last. Although Kansas is the major wheat producing State, the annual percentage loss from bunt since 1934 has been exceedingly low. Success is attributed to the planting of resistant varieties (48·4 per cent. of the acreage in 1954) and to seed treatment (57·8 per cent.).

Crosier (W.) & Szkolnik (M.). **Sulphur, karathane, and actidione for control of powdery mildew of Wheat.**—*Plant Dis. Reptr*, 40, 4, pp. 337–339, 1956.

In greenhouse experiments at New York State Agricultural Experiment Station, Cornell University, Geneva, for the control of wheat powdery mildew (*Erysiphe graminis*) [cf. 33, p. 287] karathane (1–100) provided good protection, reducing the number of infections per 100 leaves on Genesee plants sprayed at the one-leaf stage from 1,460 (first leaves) and 810 (second) for the untreated to 86 and 225 (tips only sprayed), respectively. The corresponding reductions on Yorkwin sprayed at the three-leaf stage were from 2,386 and 2,667 to 61 and 69 for plants grown in soil, and from 1,910 and 2,124 to 88 and 2 (in terralite). Micronized sulphur (6–100) reduced the number of lesions on Yorkwin to 19 and 11 (in soil) and 12 and 1 (terralite). Actidione (2 and 3 p.p.m.) reduced infection slightly but the higher concentration resulted in a marginal discoloration and necrosis of the leaves. All the materials, however, when sprayed on to the existing first and second leaves, reduced the number of lesions appearing on the subsequently developing third and fourth leaves.

Gambogi (P.). **Un esteso caso di 'nerume' del Frumento forse consequenza di freddi tardivi.** [An extensive outbreak of 'blackening' of Wheat, perhaps a consequence of late cold.]—*Agric. ital.*, 55, N.S. 10, pp. 272–277, 1955.

During 1955, the leaves and spikes of 11 ha. of S. Pastore wheat and about 5 ha. of the Roma and Vivenza varieties, sown in mid-October and growing near Pisa,

Italy, became infected by black mould (*Alternaria tenuis*) [25, p. 492; cf. 36, p. 94] and extensively lodged. The very low temperatures that had prevailed in March (average for the first ten days, 4·4° C., minimum —2·6°; average for the second ten days 7·3°, minimum —1·8°) were considered to have predisposed the plants to infection. Later sowings of the same varieties were unaffected.

Arya (H. C.) & Panwar (K. S.). **Some studies on a virulent strain of Cladosporium herbarum (Link) Fr. on Wheat.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 176–183, 1 pl., 1956.

In studies at Jaswant College, Jodhpur, India, a sooty mould disease of wheat reported near Jodhpur in 1953 was found to be caused by a virulent strain of *Cladosporium herbarum* [cf. 28, p. 281]. The leaves of a three months' old crop were severely affected, and in addition to the usual symptoms chlorotic patches developed on the other side of infected areas. Successful infection required at least 24 hours in a saturated atmosphere, intensity being increased by two per cent. sugar solution, by low winter temperatures (41° to 72° F.), and by association with *Aphis brassicae*.

Middleton (G. K.), Hebert (T. T.), & Spain (G. E.). **Mosaic resistant Wheat Taylor 49.**—*Res. & Fmg*, 15, Progr. Rep. 1, p. 10, 1 fig., 1956.

Studies at the Piedmont Research Station, North Carolina, on the resistance of Taylor wheat to wheat mosaic virus [33, p. 418] resulted in the discovery of a resistant selection designated Taylor 49, which yielded 33·6 bush. per acre over a three-year period as against 32·9 by Taylor, the protein content, general plant type, and resistance to other diseases being unchanged.

Andrews (J. E.) & Slykhuis (J. T.). **Reaction of winter Wheat varieties and Triticum × Agropyron hybrids when inoculated with streak mosaic virus by the mite vector, Aceria tulipae Keifer.**—*Plant Dis. Reptr*, 40, 6, pp. 513–516, 1956.

In greenhouse trials at the Canada Department of Agriculture, Lethbridge, Alberta, all the 1,124 common wheat accessions tested for reaction to wheat streak mosaic virus by inoculation with *Aceria tulipae* [34, p. 588] were susceptible, while 16 of 41 *Triticum × Agropyron* hybrids were resistant [36, p. 17] and five appeared to be symptomless carriers. Mites failed to survive or reproduce normally on most, though not all, of the resistant hybrid lines.

McNeal (F. H.) & Afanasiev (M. M.). **Barley stripe mosaic virus in different parts of the head in Rescue and Onas spring Wheat.**—*Plant Dis. Reptr*, 40, 5, p. 407, 1956.

At the Montana Agricultural Experiment Station seed from the top, middle, and bottom thirds of the heads from 20 plants each of Rescue and Onas spring wheat infected by barley stripe mosaic virus [35, p. 669 and next abstract] was sown in the greenhouse. Previous findings that there is no centralization of mosaic in any particular part of the head were confirmed [33, p. 532] when both varieties were considered. As the disease increased in one part of the head it also increased in the other parts. The average infection in the greenhouse plantings was 52·6 per cent. for Rescue and 35·7 for Onas.

McKinney (H. H.). **Interference and synergistic reactions with respect to Barley stripe-mosaic virus and Brome mosaic virus.**—*Plant Dis. Reptr*, 40, 6, pp. 520–523, 3 figs., 1956.

At the Field Crops Research Branch, Beltsville, Maryland, it was found that

after seven days at 75° F. systemic infection of barley and wheat by an avirulent strain of barley stripe mosaic virus [35, p. 442 and preceding abstract] blocked infection by a virulent strain. Therefore, if seedlings of a particular plant develop no symptoms when sap is inoculated into indicator varieties, such as Atsel barley or Rescue wheat, and if on superinoculation of these latter with a virulent strain symptoms appear, the original plant under test may be regarded as probably free from latent virus.

It was also found that dual infection with brome mosaic virus [32, p. 674] and barley stripe mosaic virus induced accentuated symptoms in barley and wheat. As brome mosaic virus is not known to be seed transmitted it may be used to select plants free from stripe mosaic from seed stocks where the virus is present, since virus-free plants inoculated with brome mosaic virus develop only mild symptoms.

TAKESHITA (R. M.). **Identity of the Oat red-leaf virus with the Barley yellow-dwarf virus.**—*Phytopathology*, 46, 8, pp. 436–440, 1956.

Oats with red leaf virus [32, p. 553] were collected in 33 places in Illinois and in a few in nine other States; barley plants infected by yellow dwarf virus [35, p. 761] were procured from eight States. From the following points of similarity elucidated at Illinois Agricultural Experiment Station it is concluded that the two viruses are identical: production of comparable symptoms on oats, barley, wheat, and rye; incubation periods of two to three weeks for both; transmission by the same aphid vectors (*Rhopalosiphum prunifoliae*, *Macrosiphum granarium*, *Toxoptera graminum*, and *M. maidis*); persistence of both viruses in *M. granarium* and *R. prunifoliae* for 15 days, the maximum period of observation; and failure to transmit either virus through seed or soil or by mechanical means.

HEBERT (T. T.). **New treatment for Barley loose smut.**—*Res. & Fmg*, 15, Progr. Rep. 1, p. 13, 1956.

Preliminary information on this method of control of loose smut [*Ustilago nuda*] of barley has already been noticed, [34, p. 590]. From the results of field tests it is recommended that the seed should be soaked for two to four hours in plastic bags, drained, and kept in an air-tight container such as a steel drum or a canning retort for a period depending on the temperature, i.e., 70 hours at 70° F. to 30 at 90°. It may then be sown immediately or dried and stored.

PEDERSEN (P. N.). **Infection of Barley by loose smut, Ustilago nuda (Jens.) Rostr.**—*Friesia*, 5, 3–5, pp. 341–348, 1 pl., 5 figs., 1956.

To elucidate the problem of the actual site of penetration by hyphae of barley loose smut (*Ustilago nuda*), 400 heads of the Rigel variety were inoculated by Shands's method (*Bull. Wis. agric. Exp. Sta.* 449, p. 74, 1940) [26, p. 101] immediately after flowering in 1950 at the Royal Veterinary and Agricultural College, Copenhagen. The material was fixed in Navashin's fluid and stained with safranin-light green. It was clear that Lang's theory (*Ber. dtsch. bot. Ges.*, 35, pp. 4–20, 1917) of infection through the styles is untenable. The hyphae penetrate the pericarp and enter the integuments, which they follow through the scutellum, ultimately reaching the embryo [cf. 25, p. 258; 35, p. 820].

MILLER (J. D.) & LAMBERT (J. W.). **Reaction of certain spring Barley lines to race 59 A of stem rust.**—*Plant Dis. Reptr*, 40, 4, pp. 340–346, 1 fig., 1956.

A short account of this work at the University of Minnesota, St. Paul, on the screening of spring barley lines for reaction to race 59 A of *Puccinia graminis tritici* has already been noticed [33, p. 419].

Armolik (N.), Dickson (J. G.), & Dickson (A. D.). **Deterioration of Barley in storage by microorganisms.**—*Phytopathology*, 46, 8, pp. 457–461, 1 fig., 1 graph, 1956.

The microbiological deterioration of barley during storage [34, p. 587; cf. 36, p. 16] is stated to be a problem of economic importance which has received little attention. In an attempt to obtain fundamental information concerning the function of moulds in the process [see next abstract], barleys were grown in experimental plots in various localities where the varied environmental conditions resulted in wide differences in maturity and moisture content of the grain, activity of the embryo, and the microflora on the kernels.

At the Wisconsin Agricultural Experiment Station surface-sterilized samples of 200 gm. each were inoculated with moulds from deteriorated barley and stored at moisture contents of 18 and 25 per cent., one series being aerated continuously and the other at limited periods. Even in the absence of moulds limited aeration reduced germination rapidly. *Fusarium moniliforme* [*Gibberella fujikuroi*] caused a quicker loss of germinability than did *Aspergillus flavus*, *A. niger*, *A. amstelodami*, *Penicillium cyclopium*, and *P. chrysogenum*. Culture filtrates of *G. fujikuroi* and *A. niger* reduced germination.

The small-kernelled, actively germinating, Manchurian-type varieties Kindred, Moore, and Montcalm sustained heavier damage than Atlas and the two-rowed Hannchen, Betzes, and Ymer, with their larger kernels and slower rate of germination. In general, the samples from Aberdeen, Idaho, which were harvested in dry weather, were more tolerant of poor storage conditions than were those from Madison, Wisconsin, where environmental factors seldom favour the full development of the grain, especially when combine-harvested.

Armolik (N.) & Dickson (J. G.). **Minimum humidity requirement for germination of conidia of fungi associated with storage of grain.**—*Phytopathology*, 46, 8, pp. 462–465, 1956.

The conidia of the several species of moulds responsible for the deterioration of stored barley [see preceding abstract] were found to differ appreciably in their minimum humidity requirements for germination [cf. 28, p. 347]. For instance, *Aspergillus repens*, *A. ruber*, and *A. amstelodami* germinated on malt agar films at slightly above 70 per cent. relative humidity; *A. flavus*, *A. niger*, *Penicillium cyclopium*, and *P. chrysogenum* at 79 to 81 per cent.; and *Fusarium moniliforme* [*Gibberella fujikuroi*] at 87·3 per cent. The moisture content of the agar films ranged from 10 to 20 per cent.

At low relative humidities germination was a slow process, differing from that at high. The conidia first swelled to several times their original diameter; the germ tubes were thickened, with numerous cross walls and usually swollen growing tips, but they subsequently became normal.

The relative positions of the different species in respect of germination at high sodium chloride or sucrose concentrations were similar to the foregoing.

Cruickshank (I. A. M.). **Physiologic specialization of Oat crown-rust (Puccinia coronata f.sp. avenae) in New Zealand.**—*N.Z. J. Sci. Tech.*, Sect. A, 38, 3, pp. 359–362, 1956.

Of the 13 races of *Puccinia coronata* f.sp. *avenae* [35, p. 886] identified on oats in New Zealand in 1953 and 1955, 11 were similar to the races reported from the United States [35, p. 761 and next abstract] in their effect on the differential varieties used; four, N.Z. 1 (U.S. 328), N.Z. 2 (U.S. 230), N.Z. 9 (U.S. 237), and N.Z. 12 (U.S. 286), have also been found in Australia [35, p. 670].

No single-gene source of resistance to the New Zealand races appears available.

The varieties Garry, (Victoria × Richland × Fulghum) × Belar, and Victoria × Richland × Algerian, all combining two or more genes for resistance to crown rust, are considered not completely suitable on account of their Victoria parentage and consequent susceptibility to *Helminthosporium victoriae*, which, though not yet recorded in New Zealand, is potentially important. A breeding scheme combining the resistance of Anthony, Bond, and Ukraine is suggested, suitable tester races being 7, 8, and 12.

Simons (M. C.). **The genetic basis of the crown rust resistance of the Oat variety Ascencao.**—*Phytopathology*, 46, 8, pp. 414–416, 1956.

At the Iowa Agricultural Experiment Station segregating populations arising from crosses between the Ascencao variety of oats and several other varieties were tested for reaction to *Puccinia coronata* and *Helminthosporium victoriae* [35, p. 9]. The resultant data indicated that Ascencao carried the Victoria gene, or gene complex, for reaction to both organisms, which accounted for its susceptibility to *H. victoriae* and moderate resistance to race 263 of *P. coronata*.

Ascencao also carried a hitherto undescribed gene for high resistance, designated 'E', which was epistatic to the Victoria factor in respect of reaction to *P. coronata* and, either alone or in combination with it, conditioned an immune seedling reaction to available isolates of the common North American races of crown rust. The type of resistance conferred by 'E' was superior to that shown by Landhafer, Santa Fe, or Trispernia, and it was apparently not allelic to the genes in these varieties.

Arny (D. C.). **Effectiveness of various seed treatment materials when applied to Oats with commercial treating machines.**—*Plant Dis. Reptr*, 40, 5, pp. 364–366, 1956.

In 1955 at the Departments of Agronomy and Plant Pathology, University of Wisconsin, Madison, Vicland oat seed, from a crop heavily infected under natural conditions in the previous year by *Helminthosporium victoriae* [36, p. 11], was treated in the panogen (direct) or the gustafson (slurry) treater to evaluate the effectiveness of various seed dressings when applied by machine. Treated seed was tested in the greenhouse for blight control and sown in the field for yield trials. Machine applications of organic mercury fungicides were not essentially different in effect from those done in the laboratory. Du Pont 365 slurry ($\frac{1}{2}$ oz. per bush.), however, compared less favourably with the standards ceresan M 2× slurry ($\frac{1}{4}$) and panogen 15 (direct $\frac{3}{4}$) under machine treatment (yielding an average of 39·5 bush. per acre as against 48·2 and 50·8, respectively), than with hand treatment, for which the corresponding figures were 62·7, 64·5, and 64.

Herd (G. W.). **Maize diseases during the 1954–55 season.**—*Rhod. agric. J.*, 53, 4, pp. 525–537, 1 fig., 1956.

During the 1954–5 season, climatic conditions in Rhodesia favoured the development of maize leaf blight (*Helminthosporium turcicum*) [34, p. 436], a severe outbreak occurring at Salisbury Experiment Station, where maize in a stubble mulch experiment was heavily infected. The practice of stubble mulching where the crop is grown in consecutive years should be used with caution until resistant hybrids are available. The yield from untreated 52 DH 32 (S. Rhodesia Hybrid No. 1) maize artificially inoculated with *H. turcicum* was 30 per cent. less than that from similar plants sprayed regularly with zineb (2 lb. per 100 gals. water). In variety resistance trials certain Natal inbreds displayed very satisfactory resistance.

Puccinia polysora [35, p. 508] occurred four to six weeks earlier than in previous seasons and spread widely. It was first recorded at the end of February in the Mazoe Valley at Shamva (altitude about 3,000 ft.), where infection was severe,

particularly in plantings of the S. Rhodesian single crosses N3–1–4–9 × A5–7–6 and M9–9–5 × T4–7–2–1, and there was probably some loss in yield. Outbreaks also occurred in the same valley between 3,500 and 4,000 ft., but they were later and less severe with increasing altitude. At the Sabi Valley Experiment Station infected maize yielded 25 per cent. less in grain weight than that kept free from the disease by spraying weekly with zineb [cf. above, p. 232]; owing to severe attack by maize streak virus [34, p. 707], however, this figure is very uncertain. The plants were not attacked by rust until after tasseling.

In a planting made at the Sabi Station on 25th January up to 50 per cent. of the plants were affected by streak before flowering. In areas where the virus is likely to become severe some control may be achieved by early planting and the elimination of weeds. The maize lines AFRO 235 and Sicaragua, and the Sabi inbreds KO5, NA, NB, K11, and KV 1·1 appeared to possess resistance.

Melchers (L. E.). **Fungi associated with Kansas hybrid seed Corn.**—*Plant Dis. Reptr*, 40, 6, pp. 500–506, 1 map, 1956.

During surveys for fungi associated with Kansas-grown, hybrid, seed maize from 1952 to 1954, inclusive, one to five species of each of 13 genera were found to be present. Of the fungi isolated, *Fusarium moniliforme* [*Gibberella fujikuroi*: 35, p. 673] (not regarded in Kansas as a pathogen of seed maize) was the most prevalent, affecting an average of 40 per cent. of kernels of the yellow and white maize hybrids, compared with 94 per cent. in open-pollinated Kansas varieties in 1920 to 1922 (*Phytopathology*, 14, p. 45, 1924). *Diplodia zeae* and *Nigrospora oryzae* were isolated in small percentages in some hybrid samples. *Aspergillus niger* was more prevalent than usual in white and yellow hybrids and selfed lines in 1953; infected kernels germinated less vigorously than healthy seed.

Mayerl (F.). **Aatiram — ein Präparat zur Behandlung von Saatgut mit geschwächter Vitalität.** [Aatiram—a preparation for treating seed of low vitality.] —*Bodenkultur*, 9, 1, pp. 119–121, 1 fig., 1956.

At the Saatzucht- und Versuchsanstalt Kornberg, Austria, maize seed of low vitality, treated with ceresan, germisan, or aatiram [cf. 34, pp. 468, 638], was germinated in pots under unfavourable conditions (9° to 11·5° C. for a fortnight in overwatered soil) and then transferred on the 10th June to ordinary field conditions. With aatiram (250 gm. per 100 kg. seed) there was higher percentage germination and the seedlings were more vigorous than both the untreated and seedlings receiving the other treatments. Field tests with aatiram have confirmed this finding and it is recommended for standard use.

Rich (S.). **Seed treatments to protect Corn seedlings against Stewart's wilt.**—*Plant Dis. Reptr*, 40, 5, pp. 417–419, 1956.

In greenhouse experiments at Connecticut Agricultural Experiment Station, New Haven, on the control of *Bacterium* [*Xanthomonas*] *stewarti* on maize [35, p. 292] soaking the seed in 2,4,6-trichlorophenoxyacetic acid, crag 1 herbicide (sodium 2,4-dichlorophenoxyethyl sulphate), captan, terramycin, or streptomycin, or treating it dry with HD 160 [32, p. 517] immediately before sowing reduced the severity of the symptoms on seedlings inoculated at the two-leaf stage.

Chona (B. L.) & Suryanarayana (D.). **The occurrence of Sclerospora philippinensis Weston on 'Kans Grass' (Saccharum spontaneum L.) in India.**—*Indian Phytopath.*, 8 (*1955*), 2, pp. 209–210, 5 figs., 1956.

At the Indian Agricultural Research Institute, New Delhi, in 1955, a yellowing of the leaves of *Saccharum spontaneum* plants was found to be due to *Sclerospora*

philippinensis, a new host record for India. If *S. spontaneum* acts as a collateral host, the annual recurrence of the downy mildew on maize [32, p. 176], despite the absence of the oospore stage, would be explained.

Hsi (C. H.). **Stalk rots of Sorghum in eastern New Mexico.**—*Plant Dis. Reptr*, 40, 5, pp. 369–371, 3 figs., 1956.

The environmental conditions during the summer of 1955, with favourable soil moisture in the early stages of plant growth followed by a long dry spell resulted in considerable damage by stalk rots to the dryland and lightly-irrigated sorghums in eastern New Mexico [36, p. 123]. Charcoal rot (*Sclerotium bataticola*) [*Macrophomina phaseoli*: 30, p. 153], causing lodging of over 30 per cent. of the plants in severely diseased fields, was more prevalent on sandy than on heavy soil. *Fusarium moniliforme* [*Gibberella fujikuroi*: 30, p. 518] caused severe lodging in small, confined areas in two fields. A general breaking of the stalks anywhere between ground level and the base of the peduncle over the whole area was associated with bacteria, *Rhizoctonia* [*Corticium*] *solani* [cf. 30, p. 460], and species of *Fusarium*, *Helminthosporium*, *Alternaria*, and *Penicillium*.

Wells (H. D.). **Top rot of Pearl Millet caused by Fusarium moniliforme.**—*Plant Dis. Reptr*, 40, 5, p. 387, 1956.

Fusarium moniliforme [*Gibberella fujikuroi*] was identified at the University of Georgia Coastal Plain Experiment Station, Tifton, as the fungus responsible in 1954 for a top rot in an inbred line (No. 18) of pearl millet (*Pennisetum glaucum*) [34, p. 91]. The fact that the crop in Georgia has not before been damaged by this disease suggests that most of the commercial varieties grown are highly resistant or immune.

Martin (J. P.), Klotz (L. J.), DeWolfe (T. A.), & Ervin (J. O.). **Soil fungi and growth of Citrus seedlings.**—*Calif. Citrogr.*, 41, 12, pp. 458–459, 1956.

This is a condensed account of work already noticed from another source [35, p. 676]. [The information is also published in *Calif. Agric.*, 10, 10, p. 6, 1956.]

Karel (G.). **Limonlarda kurutan (mal secco) hastalığı ve korunma çareleri.** [The Lemon disease, kurutan (mal secco) and its control.]—*Zir. Vekâl. Mücad. Enstit. Müdür, 1956*, 9, 30 pp., 10 figs., 1956.

Citrus mal secco disease (*Deuterophoma tracheiphila*) causes considerable damage in Turkey [25, p. 444], particularly in the Mersin (Içel) district, where it has destroyed 20,000 lemon trees in the past 15 years. The Dikenli Yerli or Lamas lemon is highly susceptible; Interdonato is fairly resistant, but the fruit does not store well. In the Mersin area, however, a variety known as 'Memeli' or Italian [see next abstract], with good commercial fruit, has proved resistant. Control, begun in 1945, consists in pruning and burning diseased branches and eliminating badly diseased trees.

Orshanskaya (Mme V. N.) & Ordzhonikidze (N. P.). Ускоренный лабораторный метод испытания Цитрусовых на мальсекоустойчивость. [An accelerated laboratory method of testing Citrus resistance to mal secco.]—Агробиология [*Agrobiology, Moscow*], *1956*, 5, pp. 35–44, 2 figs., 1956.

At the Central [Moscow] and Adzharia Laboratories for Quarantine of Agricultural Plants, U.S.S.R., citrus cuttings were tested for resistance to mal secco (*Deuterophoma tracheiphila*) by placing in the toxic filtrate of the fungus and noting the time necessary for complete wilting [31, p. 604]. The advantages of this method are that reaction is rapid, usually occurring in two hours to three days, sterilized

culture filtrates keep for up to a year without decrease in toxicity, and different species, varieties, and hybrids can be compared. Cuttings from a lemon of the Novo-Gruzinsky [New Georgian] variety wilted completely after 2 to 2·45 hours (low resistance), those of the Chinese (Meyer) lemon [27, p. 469] after 6·4 to 10 hours (medium resistance), and those from seedlings of the hybrid [? graft combination] lemon New Georgian × Chinese after 10·1 to 27 to 28 hours (medium to high). The high resistance of the Italian Monachello lemon [loc. cit. and preceding abstract] was confirmed as the cuttings mostly remained unwilted for 20 to 23·3 hours.

Ferrand (M.) & Bachy (A.). **La carence magnésienne du Palmier à huile au Moyen Congo.** [Magnesium deficiency of Oil Palm in the Middle Congo.]—*Oléagineux*, 12, 1, pp. 15–19, 1 diag., 2 graphs, 1957.

Further studies on the progressive deterioration or 'boyomi' disease of oil palms in the French Middle Congo [32, p. 77] confirmed the view that the condition is due to magnesium deficiency [cf. 35, p. 449]. The treatment provisionally recommended is the application of 1 kg. of magnesium sulphate per tree ('shock' treatment), followed by further applications annually at the rate of 0·5 kg. per tree until the magnesium content of the leaves has been restored to normal.

Van Suchtelen (N. J.). **Drie ziekten van de Koffiemama.** [Three diseases of the Coffee shade tree.]—*Surinaam. Landb.*, 4, 5, pp. 175–179, 4 figs., 1956. [English summary.]

This is a semi-popular account of the diseases of *Erythrina glauca* (the common shade tree of coffee in Surinam) caused by *Calostilbe striispora* [cf. 33, p. 414], which may be destructive; the rust *Dicheirinia binata*, causing hypertrophy of young shoots and producing dark brown uredosori on the leaves; and a leaf spot due to *Mycosphaerella erythrinae*. *Meliola erythrinae* and *Cercospora pitierii* were collected on dead leaves of *E. glauca*.

Ranney (C. D.). **Design and construction of a compact battery of constant-temperature tanks for Cotton seedling disease investigations.**—*Plant Dis. Reptr*, 40, 6, pp. 559–563, 4 figs., 1956.

A description is given of the construction, accuracy, and reliability of constant-temperature tanks, built in 1954 at the Texas Agricultural Experiment Station, for accurate control of soil temperatures from about 60° F. upwards in studying the effectiveness of soil-applied fungicides for the control of seedling diseases of cotton. The tanks were a modification of the Wisconsin design [24, p. 284].

Department of Agriculture, Uganda, Record of Investigations No. 4, for the period 1st April 1952 to 31st March 1954.—87 pp., 6 maps, 1956.

In the botany and pathology section of this report [34, p. 82] (pp. 3–9) D. G. Thomas states that the work on the control of cotton blackarm [*Xanthomonas malvacearum*: 35, p. 891 and next abstract] at Serere, in collaboration with Imperial Chemical Industries, Ltd., was virtually concluded [35, p. 451]. During both seasons field trials with seed dressed with an organic chemical, which had shown promise when used alone (R 3067) or in combination with copper (R 1214), again demonstrated the beneficial effects of treatment. Analysis of the relative effects of the dressings based on the nature of the active ingredient showed that the organic chemical gave a greater reduction of infection than YF 2776 containing 50 per cent. copper as the only active ingredient. This is of considerable practical importance, as the dressing combining the organic and copper is 16·5 per cent. less in price than YF 2776.

In collaboration with A. P. G. Michelmore it was found that the control of

blackarm alone by seed dressing did not give any significant yield increase in a small-scale trial, but where an insecticide was applied as well there was a very definite advantage.

Wickens (G. M.) & Logan (C.). **Plant pathology.**—*Progr. Rep. Exp. Stas. Emp. Cott. Gr. Corp.* (*Uganda*), *1955–6*, pp. 29–32, 1956.

In this report from the Cotton Research Station, Naumulonge, Uganda [35, p. 524], it is stated that the 1955–6 season was generally unfavourable to the development of blackarm (*Xanthomonas malvacearum*) [see preceding abstract]. Certain conditions (at present unknown) appear to be critical for the natural development of boll infection. The Nigerian strain 26 C/49130–21 was susceptible to all phases of the disease, while 26 C/49160–23 BCP again showed evidence of resistance. Strains from the Sudan carrying B_2B_{6m} (Domains Sakel, X1730A and X1730A $B_2B_3B_{6m}$, and BP52 B_2B_{6m}) were virtually immune from seed, leaf, and stem inoculations.

Tarr (S. A. J.). **Seed treatment against blackarm disease of Cotton in the Sudan. 4. Recent research on wet treatments.**—*Emp. Cott. Gr. Rev.*, 33, 2, pp. 98–104, 1956.

In this account of further work on the control of blackarm disease of cotton (*Xanthomonas malvacearum*) in the Sudan [33, p. 228; 35, p. 423], it is pointed out that because of the high seedling population (over 100,000 seedlings per acre in the Gezira) it is of great practical importance to reduce seed-borne infection to a minimum. The heavy sowing-rate is largely unavoidable, about ten seedlings per sowing-hole often being required in order to break through the hard crust which forms after irrigation and subsequent drying of the surface soil.

Provided there is adequate wetting of the whole seed mass, more thorough penetration of fungicide is given by wet treatment than by even a very finely divided powder. A short-wet treatment recommended consists in spraying the seed with MEMA solution (about 0·386 per cent. mercury) at 50 ml. per lb. and mixing rapidly for about ten minutes. If infection is heavy the solution should contain about 0·772 per cent. mercury.

Large-scale steeping would probably require the use of at least 300 ml. of MEMA solution containing not less than 0·1 per cent. mercury per lb. of heavily contaminated seed for a two-hour steep. Although steeping was approximately as effective as the short-wet method, on a large scale it would require special machinery for drying the seed; further, the progressive weakening of the steeping solution would entail regular sampling and analysis and periodical additions of MEMA. With the short-wet method all the disinfectant is absorbed, the seed is only slightly wet after treatment, and inexpensive mixers are available. In a preliminary trial a revolving drum mixer made by Messrs. J. Booth and Son, Ltd. gave satisfactory results. This machine has a mixing capacity of 35 cu. ft. and 800 lb. of seed can be treated in one operation of half an hour.

Simpson (D. M.). **Strains of Cotton resistant to bacterial blight.**—*Plant Dis. Reptr*, 40, 6, pp. 549–555, 1956.

The reduction in cotton yields due to bacterial blight [blackarm] (*Xanthomonas malvacearum*) [35, p. 284 and preceding abstracts] in the United States in 1955 was estimated at 1·08 per cent. Losses, reaching up to 50 per cent. of the crop during epiphytotics, are greatest in the southwest, particularly in the irrigated areas of New Mexico and Arizona and in the dry-land areas of Texas and Oklahoma. So far, two races of the bacterium are known. Brief descriptions of the 35 resistant varieties and strains of cotton available in the United States for breeding are set out in tabular form, with the resistant genes present, and the sources of seed listed.

Fulton (N. D.), Waddle (B. A.), & Thomas (R. O.). **Influence of planting dates on fungi isolated from diseased Cotton seedlings.**—*Plant Dis. Reptr*, 40, 6, pp. 556–558, 1 graph, 1956.

In co-operative studies by the Arkansas Experiment Station and the United States Department of Agriculture in 1954 *Rhizoctonia* [*Corticium*] *solani* was the most frequently isolated pathogenic fungus from month-old cotton seedlings sown on 30th April in uniform plots at Osceola. On those from plots treated with PCNB *Fusarium moniliforme* [*Gibberella fujikuroi*] predominated, followed by *Fusarium* spp. and *C. solani* in that order. From seedlings sown on 20th May *Sclerotium bataticola* [*Macrophomina phaseoli*] comprised 75 per cent. of the pathogenic isolates from untreated plots, *Fusarium* spp. and *Colletotrichum* [*Glomerella*] *gossypii* being predominant on the other plots. The two fungi predominant earlier on were reduced to 15 to 25 per cent. In a June sowing *G. gossypii* and *Fusarium* spp. increased up to 100 per cent. on plots treated with PCNB. Thus, furrow applications of PCNB (5 lb. per acre in 5 gals. water) effectively eliminated both *C. solani* and *M. phaseoli* but allowed the other pathogenic species to increase.

Orlandi (L.). **Azione del ioduro di potassio, da solo ed in associazione con antibiotici, su colture di Botrytis bassiana Bals.** [The action of potassium iodide, alone and in association with antibiotics, on cultures of *Botrytis bassiana* Bals.] —*Ann. Sper. agr.*, N.S., 10, 2, pp. 647–651, 1956. [English summary.]

In further work at the Experimental Station for Mulberry and Silkworm Culture, Ascoli Piceno, Italy, potassium iodide used alone at not less than 1 per cent. inhibited spore germination of *Botrytis* [*Beauveria*] *bassiana* [35, p. 184]. The addition of penicillin, streptomycin, or chloramphenicol did not increase the effectiveness of the potassium iodide or of the antibiotic. A mixture of tirotricin (0·001 or 0·0005 per cent.) with potassium iodide (0·1), however, was more effective than either constituent alone.

Van Steveninck (R. F. M.) & Cruickshank (I. A. M.). **Selection for disease resistance in Linseed.**—*N.Z. J. Sci. Tech.*, Sect. A, 38, 3, pp. 239–247, 1956.

A survey in New Zealand over the period from 1948 to 1953 showed that diseases are an important factor in the cultivation of linseed flax, rust (*Melampsora lini*) [36, p. 29] and pasmo (*Sphaerella* [*Mycosphaerella*] *linorum*) [34, p. 213] still being the most serious, though rust incidence has declined since the abandonment of autumn sowing and the introduction of field-resistant varieties. Browning (*Polyspora lini*) [loc. cit.], though widespread, has caused no heavy loss since the 1948–9 season.

Of the linseed varieties tested in field plots by spraying at early flowering on three successive evenings with a spore suspension, Bison and Very Pale Blue Crimped were resistant to *M. linorum*, while Calar, Uruguay F. 79, and Moose × N.D.F. 118 showed high resistance to *P. lini*. Selection for rust resistance from local commercial varieties and foreign introductions indicated that Koto selections 5 and 25 are suitable replacements for Koto (attacked by races 8 and 9), Rocket, Redwood, and Daenfeldt being suggested instead of the highly susceptible Golden Viking.

Dittrich (K.). **Ein neues Mittel zur Bekämpfung des Grauschimmels an Blumen und Zierpflanzen.** [A new means for the control of grey mould on flowers and ornamentals.]—*Bayer. landw. Jb.*, 33, 3, pp. 368–370, 1 fig., 1956.

From a horticultural institute in Bavaria, Germany, the author reports excellent prophylaxis and control of grey mould (*Botrytis cinerea*) on *Begonia semperflorens*, *Cyclamen persicum*, Cactaceae, cineraria, *Chrysanthemum indicum*, *Fuchsia speciosa*,

Hydrangea macrophylla, *Pelargonium zonale*, and other flowers and ornamentals by dusting with 'B 500', supplied in 1955 by the firm of Riedel de Haën, Seelze, Hanover.

NEERGAARD (P.). **Yellow phyllode spot and drop of Acacia armata R. Br. (Septoria acaciae sp. nov.).**—*Friesia*, 5, 3–5, pp. 325–331, 1 pl., 4 figs., 1956.

In October, 1954, a serious phyllode spot was observed for the first time on a consignment of *Acacia armata* from a nursery in North Zealand, Denmark, being inspected for export. The disease caused a reduction of about 50 per cent. in the commercial value of several thousand plants under glass. Cultivation has been discontinued.

Chlorotic spots, often less than 1 mm. in diameter, are distributed at random over the phyllode. Circular at first, they become irregular and sometimes necrotic at the centre, usually coalescing almost to cover the phyllode. The affected tissues are abnormally solid, dry, and somewhat thicker than healthy ones. Infection spreads from below upwards, the phyllodes dropping successively. Pycnidia form profusely in these, and they should be removed.

Septoria acaciae n.sp. produces amphigenous, subepidermal, subglobose to lenticular, glabrous, dark brown, pseudoparenchymatous pycnidia, frequently situated below a stoma and provided with a wide ostiole at maturity; they are 60 to 110 μ in diameter. The filiform to subcylindrical, straight or rarely slightly curved, often indistinctly uniseptate, hyaline conidia, 8 to 36 by 1 to 2·5 μ, emerge in white to pinkish masses. On malt agar a dense, velvety, white to pale grey aerial mycelium (dark olive-green to nearly black below the surface) is formed.

JACKS (H.) & WEBB (A. J.). **Glasshouse tests for control of Antirrhinum rust.**—*N.Z. J. Sci. Tech.*, Sect. A, 38, 3, pp. 309–311, 1956.

In glasshouse experiments at the Plant Diseases Division, Auckland, New Zealand, the most effective fungicides for the control of rust (*Puccinia antirrhini*) on artificially inoculated Majestic antirrhinum plants [35, p. 636] were dithane Z-78 (2 lb. per 100 gals. water), wettable sulphur (5·3 lb. cosan or aasulpha supra), fermspray (1 lb.), dithane M22 and manzate (both at 0·5 lb.), phygon XL (0·5 lb.), tetram (2·5 lb.), thirospray (4 lb.), colsul 40 (10), and dithane D-14 (1–$\frac{1}{2}$–$\frac{1}{4}$). All reduced the mean number of lesions per leaf to less than 1 as against 516·3 for the water-treated controls.

FAUREL (L.) & SCHOTTER (G.). **Un champignon parasite du Géranium rosat en Algérie, Lasiodiplodia frezaliana n.sp.** [A fungus parasitic on the rose Geranium in Algeria, *Lasiodiplodia frezaliana* n.sp.]—*Bull. Soc. Hist. nat. Afr. N.*, 47, 3–4, pp. 115–127, 3 figs., 1956.

In October, 1955, the authors received from Algeria wilted *Pelargonium capitatum* plants. Cuttings are planted annually there between December and January and the plants are taken up after four years. The disease, which starts near the collar, occurs at the end of the summer, its intensity being related to high temperatures and drought. As rain comes affected plants not killed make new growth and recover. Losses over the four-year crop may total 75 per cent.

On infected stems there were globular or subglobular, sparse or gregarious pycnidia (sometimes enclosed in a stroma) 200 to 250 μ in diameter. The elliptical, simple, hyaline, later 2-celled, opaque spores measuring 24 to 28 by 15 to 17 μ are not constricted or only slightly constricted at the median septum. *Lasiodiplodia frezaliana* is very close to *L.* [*Botryodiplodia*] *theobromae*, from which, however, it differs in not causing a wet rot, and in its occurrence in a temperate region as an active parasite of rose geranium, on which *B. theobromae* has been reported from Madagascar as a secondary parasite to a *Verticillium* sp. [35, p. 719].

Munnecke (D. E.). **Alternaria leaf spot of Geranium.**—*Plant Dis. Reptr*, 40, 5, pp. 452–454, 1 fig., 1956.

Inoculations in the greenhouse at the Department of Plant Pathology, University of California, Los Angeles, showed that *Alternaria tenuis* [cf. 25, p. 579], which often causes severe leaf spotting on *Pelargonium hortorum* during the winter in southern California, can be an active parasite. The disease is usually more severe in fields within a mile of the coast than in those further inland. The symptoms may be confused with those of *Xanthomonas pelargonii* [35, p. 457; 36, p. 31] and the plants rogued unnecessarily; *A. tenuis*, however, is most prevalent on the lower leaves, there is no wilting of the lamina, and the spots are very irregular in size, varying from under 1 to 10 mm. in diameter, the larger ones sometimes with dark brown, concentric rings. Sporulation is most abundant on fallen leaves, though it occurs occasionally while they are still attached. Severe infections may kill the leaf or cause considerable defoliation.

Verona (O.) & Loprieno (Nicola). **Tumori radicali in Gypsophila paniculata L.** [Root galls in *Gypsophila paniculata* L.]—*Ann. Sper. agr.*, N.S., 10, 1, pp. 133–143, 3 pl. (1 col.), 1956. [English summary.]

From yellowish galls with a wrinkled surface, measuring 0·5 to 5 cm. in diameter, on the root crown of *Gypsophila paniculata* plants growing near Viareggio, Italy, in 1950, the authors isolated *Agrobacterium gypsophilae* [24, p. 419; 25, p. 292]. The disease does not appear to have been recorded in Italy before.

Chumaevskaya (Mme M. A.). Возбудитель туберкулеза Олеандра в СССР. [The causal agent of tuberculosis of Oleander in the U.S.S.R.]—Докл. Акад. сельскохоз. наук Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 21, 9, pp. 40–42, 1 fig., 1956.

At the Moscow Station of Plant Protection the causal bacterium of knot of oleander, first observed in the U.S.S.R. in 1953, is attributed to *Ps*[*eudomonas*] *tonelliana* [28, p. 513], which is held to differ from *P. savastanoi* var. [f.sp.] *nerii* [31, p. 225] in that it ferments glucose and galactose.

Husz (B.) & Podhradszky (J.). **A vészes Tulipánfoltosság Magyarországon.** [An epiphytotic of Tulip fire in Hungary.]—*Agrártud. egy. Évkön.*, 1 (*Agrártud. egy.*, 14), 1, pp. 136–139, 1 pl., 1950. [Russian and French summaries. Received November, 1956.]

In the spring of 1950 *Botrytis tulipae* appeared in epidemic form on tulips near Budapest and at Szeged, Hungary. The outbreak was largely due to the warm, humid weather in April. The yellow varieties were less susceptible than the red.

Pohl (R. W.). **Andropogon praematurus, a fungus-induced monstrosity.**—*Rhodora*, 58, 695, pp. 326–327, 1956.

Studies at the Iowa Agricultural Experiment Station showed that the pedicellate spikelets of *Andropogon praematurus* are caused by kernel smut (*Sphacelotheca* sp.) [cf. 35, p. 681] which destroys the flowers of both the pedicellate and sessile spikelets. All the peculiarities which led to the differentiation of *A. praematurus* as a species are ascribed to the effects of systematic smut infection, viz. malformation of organs, small stature, and early blooming.

Frandsen (K. J.). **Variations in resistance of Trifolium pratense to attacks of Kabatiella caulivora (Kirchn.) Karak.**—*Friesia*, 5, 3–5, pp. 231–233, 2 figs., 1956.

Severe damage to red clover crops by *Kabatiella caulivora* is occasionally

reported in Denmark [25, p. 203], complete failure having been observed in seed fields. Heavy losses have also been recorded in Germany [13, p. 382; 25, p. 455] and Holland. In 1948 and 1954 the fungus was highly pathogenic to second-year stands at the Plant Breeding Station, Øtoftegaard. In the particularly heavy attacks of 1948 significant variations in resistance, ranging from 1 to 8·9 in an infection scale from 0 to 10, occurred among the experimental families, indicating the potentialities of selection for resistance.

Grylls (N. E.) & Butler (F. C.). **An aphid transmitted virus affecting subterranean Clover.**—*J. Aust. Inst. agric. Sci.*, 22, 1, pp. 73–74, 1956.

The serious virus disease of subterranean clover in south-eastern Australia [35, p. 418; 36, p. 103] was experimentally transmitted by *Aphis craccivora* and *Myzus persicae*, but not by three species of leafhopper tested, nor mechanically, nor by seed. The disease is reported to be widespread in New South Wales, and an apparently similar condition also occurs in Tasmania, Victoria, and Queensland.

Allison (J. L.), Hemerick (G. A.), & Nelson (R. R.). **Pleospora herbarum and Pleosphaerulina hyalospora, two pathogenic ascomycetes of forage legumes.** —*Plant Dis. Reptr*, 40, 5, pp. 377–379, 1956.

Pleospora herbarum [35, p. 21] and a fungus morphologically similar to *Pseudoplea trifolii* [33, p. 358] were isolated by means of ascospore discharge from sclerotioid ascocarps on the overwintered dead stems of lucerne and stolons of white clover in North Carolina. The authors discuss the confusion in the literature on the nomenclature of the second, for which they consider the binomial *Pleosphaerulina hyalospora* has priority, and give a provisional list of synonyms.

Jacks (H.). **Seed disinfection. XIV. Effect of seed dressings on damping-off and nodulation of Lucerne.**—*N.Z. J. Sci. Tech.*, Sect. A, 38, 3, pp. 312–315, 1956.

In further studies in this series [cf. 35, p. 886] at the Plant Diseases Division, Auckland, New Zealand, *Pythium ultimum* was identified as the organism responsible for damping-off patches observed in lucerne fields [cf. 33, p. 608]. Seed dressings based on dichlone, captan, thiram, and ferbam increased emergence in inoculated soil in the greenhouse. Although post-emergence damping-off was not completely prevented by any of the treatments, dichlone, captan, and, to a lesser extent, thiram significantly reduced the number of diseased seedlings.

Development of *Rhizobium meliloti* remained unaffected by these treatments when the seed was sown immediately after dressing.

Erwin (D. C.). **Important diseases of Alfalfa in southern California.**—*Plant Dis. Reptr*, 40, 5, pp. 380–383, 1956.

A survey of the diseases of lucerne in southern California was started in 1953 as a basis for the development of improved, resistant varieties, suited to the unique climatic conditions of the irrigated desert valleys in this area. Among the more important diseases described are anthracnose (*Colletotrichum trifolii*) [33, p. 637], found for the first time in the Orange, Santa Barbara, and Imperial counties, *Phytophthora* root rot (*P. cryptogea*) [34, p. 791], newly recorded in the Imperial Valley, bacterial wilt (*Corynebacterium insidiosum*) [35, p. 896], which is on the increase, reported for the first time in Imperial county, lucerne dwarf virus [33, p. 464], decreasing in incidence, *Rhizoctonia* root canker (*R.* [*Corticium*] *solani*) [33, p. 730], serious in the irrigated desert valleys, and control of which is still unknown, and scald due to high soil temperature and heavy irrigation. Re-seeding damaged stands each autumn following scald or *Corticium* root canker is commonly practised in the Imperial Valley.

Cormack (M. W.) & Moffatt (J. E.). **Occurrence of the bacterial wilt organism in Alfalfa seed.**—*Phytopathology*, 46, 7, pp. 407–409, 1 fig., 1956.

This is a more detailed account of the transmission of *Corynebacterium insidiosum* in lucerne seed, than that already noted from another source [35, p. 896].

Graber (L. F.). **Registration of varieties and strains of Alfalfa.**—*Agron. J.* 48, 12, pp. 587–588, 1956.

A full description is given of Vernal lucerne, resistant to bacterial wilt [*Corynebacterium insidiosum*: 33, p. 32]; over 4,800,000 lb. of certified seed was produced in 1955 for general use.

Baker (A. S.) & Cook (R. L.). **Need of boron fertilization for Alfalfa in Michigan and methods of determining this need.**—*Agron. J.*, 48, 12, pp. 564–568, 1 fig., 1 graph, 1956.

In Michigan no case of boron deficiency of lucerne [34, p. 372] was observed where the boron content of coarse-textured soils reached 1 p.p.m. and that of heavier soils 0·9 p.p.m. Deficiency was more prevalent in the former soils than in the latter; it was seldom apparent during periods of adequate moisture supply. The apical portions of boron-deficient lucerne were lower in boron, calcium, potassium, magnesium, and protein than the more mature parts, the reverse being true for normal plants.

A boron content of 20 p.p.m. or less indicates the likelihood of deficiency, and the need for fertilizer can be estimated by the boron content of the apical portion after two or three weeks of dry weather.

Rogerson (C. T.). **Diseases of grasses in Kansas : 1953–55.**—*Plant Dis. Reptr*, 40, 5, pp. 388–397, 1956.

The results are presented of a study of grass diseases in Kansas [cf. 34, p. 789] during 1953 to 1955. Seventeen fungi associated with grass diseases, all new for Kansas, and 30 new host records are included in this annotated list, arranged under the hosts. Among the fungus records are *Ascochyta sorghina* on *Sorghum halepense* and Sudan grass, *Curvularia geniculata* on *Poa pratensis*, *Sphacelotheca destruens* [map 219] on *Panicum dichotomiflorum*, and *Ustilago cynodontis* on *Cynodon dactylon*. *Andropogon scoparius* is a new host of *Gibberella maydis* and *Lolium perenne* of *Puccinia coronata*.

Kerr (A.). **Factors influencing the development of brown patch in lawns of Sagina procumbens L.**—*Aust. J. biol. Sci.*, 9, 3, pp. 332–338, 1 pl., 1956.

Records at the Waite Agricultural Research Institute, Adelaide, showed that the meteorological conditions required for the appearance of brown patch disease (*Pellicularia praticola*) [*Corticium solani*: 35, p. 356] in *Sagina procumbens* lawns were a minimum atmospheric temperature between 63·5° and 68° F. and the presence of free moisture or very high humidity at the lawn surface [33, p. 728]. At 77° infection took place in 8 to 12 hours.

Observations and inoculation experiments suggested that the fungus probably survives the winter as a saprophyte or as dormant mycelium or sclerotia in isolated spots in the lawn or the soil beneath: in early summer it comes to the surface and parasitizes the leaves. This initial period of parasitism provides the fungus with nutrients which enable it to grow intensively and extensively as a saprophyte under the lawn surface until conditions conducive to parasitism return. If the earlier saprophytic growth has been widespread, the disease takes the form of a 'smoke ring', hyphal activity being greater at the growing edge of the colony than behind it; if, on the other hand, such growth has been limited a 'brown patch' is formed.

These alternating phases of parasitic and saprophytic growth may continue throughout the summer, with the result that patches formed towards the end of the summer are generally much more extensive than those that developed earlier.

Gambrell (F. L.) & Gilmer (R. M.). **Insects and diseases of fruit nursery stocks and their control.**—*Bull. N.Y. St. agric. Exp. Sta.* 776, 50 pp., 22 figs., 1 diag., 1956.

This useful publication describes the principal diseases (including those caused by viruses) and pests of tree fruit stocks in New York State nurseries, together with measures recommended for their control. Results of fungicide tests are summarized in numerous tables and there is a final table containing spray formulations and schedules. There is a bibliography of 24 items.

Kröber (H.). **Rinden und Fruchtfäule an Kern-, Stein- und Beerenobst durch Phomopsis-arten.** [Bark and fruit rot of pip, stone and berry fruit, caused by *Phomopsis* species.]—*NachrBl. dtsch. PflSchDienst*, 8, 11, pp. 161–164, 7 figs., 1956.

In recent years apple, pear, plum, and greengage trees in the Rhineland have been attacked by a fungus provisionally identified as *Phomopsis mali* [*Diaporthe perniciosa*: cf. 30, p. 616; 33, p. 707], causing fruit rot and extensive lesions of the trunk, branches, or twigs, with death of the parts above the lesions, and later of the tree itself, following the spread of infection.

In the vicinity of Bonn *Phomopsis ribis* causes a similar die-back of gooseberry, affecting 10 to 50 per cent. of the bushes in some plantations. The stem lesions are not visible externally, but appear chocolate brown in section.

Heyns (A. J.) & De Wet (A. F.). **Prevention and spreading of crown gall.**—*Fmg in S. Afr.*, 32, 8, pp. 56–59, 6 figs., 1956.

This paper deals with the symptoms, life-history, and control of crown gall (*Agrobacterium tumefaciens*) on fruit trees in South Africa. Preventive control by rotation of nurseries and by destruction of infected trees at transplanting is recommended. Soil treatment has proved expensive and unsatisfactory. Excision of galls on mature trees and treatment with DNC is recommended [cf. 35, p. 817].

Parker (K. G.), Fisher (E. G.), & Mills (W. D.). **Fire blight on pome fruits and its control.**—*Cornell Ext. Bull.* 966, 23 pp., 6 figs., 1956.

In this useful publication the species and varieties of Rosaceae affected by fireblight (*Erwinia amylovora*) [36, p. 192] in New York and the symptoms, life-history, and control of the disease on apple and pear are discussed. A seasonal guide to cultural practices and control measures is appended.

Lehoczky (J.). **Az Alma koromfoltossága.** [Sooty blotch of Apples.]—*Agrártud. egy. Évkön.*, 1 (*Agrártud. egy.*, 14), 1, pp. 95–100, 2 pl., 1950. [Russian and English summaries. Received November, 1956.]

The appearance of sooty blotch (*Gloeodes pomigena*) in the mycelial state on apple [cf. 35, p. 205] is reported from Hungary. Susceptible varieties were Batul and Cox's Orange. The disease is controlled by the Bordeaux applications used against scab (*Venturia inaequalis*) [35, p. 303 and next abstract]. The blotches can be removed by rubbing the fruit with damp sawdust in a barrel, or by soaking it for five minutes in 5 per cent. chlorinated water or 2·5 per cent. calcium hypochlorite, then washing and drying.

Bohus (G.) & Szabó (K.). **Permetezési kísérletek fenilmerkurikloriddal az Almavarasodás leküzadésíre.** [Experiments on spraying with phenylmercury-chloride against Apple scab.]—*Agrártud. egy. Évkön.*, 2 (*Agrártud. egy.*, 15), 1, pp. 211–219, 1951. [Russian and German summaries. Received November, 1956.]

In experiments in Hungary from 1949 to 1951, 0·01 per cent. phenyl mercury chloride was as effective as 1 per cent. Bordeaux mixture in controlling apple scab (*Fusicladium dendriticum*) [*Venturia inaequalis*: see preceding abstract] and much more economical. In years unfavourable to scab a 0·005 per cent. solution gave satisfactory protection. The amount of residue on the fruit is harmless and at up to 0·01 per cent. the spray caused no leaf scorch. A further advantage is that the preparation can be used in combination with insecticides.

Olgyay (M.) & Lehoczky (J.). **Almafaliszthartmat elleni védekezési kísérletek.** [Experiments on the control of Apple mildew.]—*Agrártud. egy. Évkön.*, 3 (*Agrártud. egy.*, 16), 1, pp. 115–129, 5 figs., 1952. [Russian and English summaries. Received November, 1956.]

Experiments carried out in Hungary over a period of three years showed that spraying alone, or combined with autumn pruning of infected material, failed to control apple mildew (*Podosphaera leucotricha*) [26, p. 317]. In addition to the autumn pruning it was necessary to remove the primary infections in the spring between bud burst and red bud, when the first two sprays were applied, these being followed by three to five post-blossom sprays of lime-sulphur plus iron sulphate, or the same alternating with Bordeaux mixture. These measures should be carried out every year to maintain a low level of infection.

Wilson (E. E.) & Schein (R. D.). **The nature and development of non-infectious bud failure of Almonds.**—*Hilgardia*, 24, 18, pp. 519–542, 4 figs., 5 graphs, 1956.

Most of the information in this detailed account of bud failure of almonds in California has already been noticed [32, p. 615]. Pruning of affected trees tends to increase the severity of symptom expression; the disorder is seed-transmitted.

Weigle (C. G.). **Powdery mildew (Podosphaera tridactyla) on Almond.**—*Plant Dis. Reptr*, 40, 6, p. 584, 1956.

Podosphaera [*oxyacanthae* var.] *tridactyla* is reported to be responsible for the powdery mildew observed in 1955 on almonds at the United States Department of Agriculture Plant Introduction Gardens, Chico, California. The fungus has not previously been recorded on this host in the United States.

Terts (I.). **Az őszibarack-le vél sárgulás (klorózis) talajtani Okáról.** [The soil-induced chlorosis of Peaches.]—*Agrártud. egy. Évkön.*, 2 [?5] (*Agrártud. egy.*, 18), 1, pp. 57–63, 1954. [Russian and English summaries. Received 1956.]

Chlorosis of peaches in the vicinity of Budapest, Hungary, was found to be due to excess lime (above 8 to 10 per cent. available calcium carbonate) in the soil. If this limit is not reached in the upper 30 to 40 cm. of the soil an excess in the deeper layers is not dangerous.

Ito (T.). **Control of Persimmon anthracnose.**—*Agric. & Hort., Tokyo*, 31, 7, pp. 961–964, 1956. [Japanese. Abs. from an English summary.]

It was demonstrated by means of spore traps that spore discharge in *Gloeosporium kaki*, the agent of persimmon anthracnose in Japan [26, p. 474], reaches a climax in late June and early September, while the conidia borne on the twigs during the autumn survive until the following May. Spraying with zineb or ziram gives effective control.

Daines (R. H.) & Cohoon (D. F.). **Peach canker study reveals facts necessary for control.**—*N.J. Agric.*, 38, 3, pp. 14–16, 2 figs., 1956.

Some of this information on peach canker (*Fusicoccum amygdali*) has already been noticed [33, p. 678; 36, p. 196]. Inoculation experiments in the spring at the New Jersey Agricultural Experiment Station showed that infection during bud-swelling killed buds before or just after opening. Later infections caused a higher proportion of cankers at the base of the current year's twigs, though many terminals were not killed for three or four months. In a Raritan Rose orchard 6 per cent. of fruit scars became infected following the June drop and a similar percentage developed cankers after harvest.

Daines (R. H.). **Bacterial spot of Peach (Xanthomonas pruni) and its control by the use of captan and streptomycin.**—*Plant Dis. Reptr*, 40, 4, pp. 335–336, 1956.

No satisfactory method of control of the bacterial spot (*Xanthomonas pruni*) of peaches [35, p. 903] has been developed in New Jersey. Captan (3 lb. per 100 gals.), the standard treatment, frequently causes leaf damage. In an experiment in 1955 the best results were obtained with captan (4 lb.) and a combination of captan (2 lb.) with streptomycin (150 p.p.m.), which reduced the percentage fruit infection from 31·6 (untreated) to 9·6 and 7·5 per cent., respectively, as against 20 per cent. for 2 lb. captan alone, indicating that streptomycin gave considerable protection. The sprays were applied on a seven- to ten-day schedule, beginning on 6th July, when considerable fruit spot had appeared. Similar results but on a smaller scale were obtained for foliage infection. Assays of the sap from washed leaves revealed an average concentration of 9 p.p.m. streptomycin. None was found in the fruits.

Husz (B.) & Klement (Z.). **A csonthéjas gyümölcsfák viruszos mozaikbetegsége.** [On virus diseases of stone fruits.]—*Agrártud. egy. Évkön.*, 1 (*Agrártud. egy.*, 14), 1, pp. 83–94, 9 pl., 1950. [Russian and English summaries. Received November, 1956.]

Virus diseases of stone fruit trees noticed for the first time in Hungary in 1948 included plum pox on prune and plum trees [27, p. 27; 35, p. 774] and peach mosaic virus [35, p. 775] on imported peach trees of the varieties Gasparette, Angevine de Money, Souvenir de Pierre Tochon, and Royal de Cardonnelle.

Crosse (J. E.). **An epidemic leaf spot and spur wilt of Cherry caused by Pseudomonas mors-prunorum.**—*Rep. E. Malling Res. Sta., 1955*, pp. 121–125, 5 pl., 1956.

In May, 1953, a new form of the cherry disease caused by *Pseudomonas mors-prunorum* [cf. 35, pp. 799, 874] was observed in Kent, characterized by a wilting of the fruiting spurs and leaf spotting of unusual severity. Trees of all ages were involved, and on some in full cropping up to 30 per cent. of the fruiting spurs were affected. In contrast to normal years, when leaf infections are generally confined to the neighbourhood of the overwintering cankers, both leaf spot and spur wilt occurred throughout the trees, the leaf spots causing greater damage than usual. The spur wilt mostly originated from infection through the petiole bases of the current year's spur growth, though wilting was sometimes not accompanied by lesions on the young growth and probably originated in the previous year's growth from diseased flower peduncles. Waterlogged necrosis in the cortex later became black and girdled the spur, resulting in collapse. The variety Early Rivers was the worst affected, Knight's Early Black and Bedford Prolific rather less, and Roundel, Frogmore, and Napoleon (mid-season varieties) to a minor degree. Late-flowering Florence and Bradbourne Black were unaffected.

The abnormal outbreak was attributed to a concurrence of weather conditions

optimum for infection, namely, a long period of wind-driven rain, and a maximum state of host infectability.

The application of dilute inoculum under pressure from a spray gun or misted on to leaves from a throat spray showed that pressure infection was considerably the greater; penetration of the bacteria was via the stomata. Severity of the disease was associated with the stage of leaf and flower development, rather than with any inherent resistance or otherwise. Spring spraying at white bud [loc. cit.] had failed to give control, but in one orchard a petal-fall spray of Bordeaux mixture had seemed to do so. In orchards where regular spring and autumn spraying had been practised over a period of years the epidemic did not occur, probably due to the absence of inoculum.

Milbrath (J. A.) & Williams (H. E.). **A decline of sour Cherry caused by a virus of the little Cherry type.**—*Phytopathology*, 46, 10, pp. 535–537, 2 figs., 1956.

A virus disease of Montmorency sour cherries, first observed in Polk County, Oregon, in 1951 [cf. 35, p. 689], caused a marked decline in growth, small leaves, and late maturation of fruit, which was pink to orange in colour. Transmitted by grafts to sweet cherry it caused mild chlorosis and leaf rolling, with some leaf bronzing towards autumn. Fruits were small, late maturing, and light in colour darkening later except for two bilateral depressed areas. Sour cherry on both sweet cherry and *Prunus mahaleb* stocks reacted similarly to the virus.

The virus in question belongs to the little cherry group [cf. 32, p. 681] and seems to be related to that recently found in certain flowering cherries [see next abstract]. This little cherry virus was originally isolated in Oregon as a contaminant of a pink fruit virus [23, p. 392] in cherry. The virus concerned may be a distinct strain, but its relationship to the little cherry disease of British Columbia [35, p. 200] needs to be clarified before it is named.

Reeves (E. L.) & Cheney (P. W.). **Foliage symptoms on sweet Cherry infected with the little-Cherry-type virus obtained from Kwanzan and Shiro-fugen oriental flowering Cherries.**—*Plant Dis. Reptr*, 40, 5, pp. 408–409, 1 fig., 1956.

Foliage symptoms developed on certain varieties of sweet cherries infected by a virus of the little cherry type, obtained from Kwanzan and Shiro-fugen flowering cherries [35, p. 465] during the late summer and autumn of 1955 in experimental plots at Wenatchee, Washington. Symptoms were previously believed to be confined to the fruits [loc. cit.]. A reddish-bronze coloration of the interveinal areas and yellowing along the veins was typical of Bing trees, there being some variation in the colour pattern in different varieties. The leaf symptoms serve to differentiate this disease from that caused by [peach] western X virus [33, p. 735] with which, on the basis of fruit symptoms on Bing, it is often confused.

Kaszonyi (S.). **Gloeosporium ribis (Lib.) Mont. et Desm. f. sp. grossulariae Kleb. A köszméte Gloeosporium-os betegségének hazai előfordulása.** [*Gloeosporium ribis* (Lib.) Mont. & Desm. f. sp. *grossulariae* Kleb. A disease of Gooseberry caused by *Gloeosporium* in Hungary.]—*Agrártud. egy. Évkön.*, 2 (*Agrártud. egy.*, 15), 1, pp. 205–210, 3 figs., 1951. [Russian and English summaries. Received November, 1956.]

In 1951 *Gloeosporium ribis* f.sp. *grossulariae* was recorded for the first time on gooseberries in Hungary, causing severe leaf drop in both dry areas and those receiving heavy rain. The fungus is considered to differ from *Pseudopeziza ribis* on red currant [cf. 35, p. 623]. Neighbouring bushes of red and black currant, *Ribes aureum*, and *R. alpinum*, were unaffected.

Hårdh (J. E.). **Karviaishärmä ja sen torjunta.** [Gooseberry mildew and its control.]—*Valt. Maatalousk. Julk.* 150, 12 pp., 2 figs., 1956. [English summary.]

First detected in Finland in 1904, gooseberry mildew (*Sphaerotheca mors-uvae*) [map 16] is now co-extensive with gooseberry and currant cultivation. Resistance occurs in the mountain gooseberry and some indigenous varieties, including Pellervo. Spraying experiments were carried out using a knapsack machine between 1949 and 1955 with a number of commercial preparations, of which karathane WD [35, p. 780] was the most effective. Used throughout the season it tended to cause russeting, but good results were obtained by the application of 1·5 per cent. Burgundy mixture for the pre- and first post-blossom treatments, followed by a further one to four with 0·12 per cent. karathane.

Vaughan (E. K.), Dobie (N. D.), Clark (R. R.), Miller (P. W.), & Waldo (G.). **The Oregon Strawberry plant propagation center.**—*Plant Dis. Reptr*, 40, 4, pp. 322–324, 2 figs., 1956.

Most of this information on the propagation of strawberry plants at the Oregon Strawberry Plant Propagation Center, Corvallis, has already been noticed from other sources [31, p. 441; 35, p. 833; 36, p. 38]. Nuclear propagating stocks of 19 strawberry varieties and selected seedlings, apparently free from pests and diseases, are available to commercial propagators, and planting stocks of 15 promising selected seedlings and 13 named varieties, including the virus indicator plant *Fragaria vesca* (East Malling strain), were expected to be available for testing and multiplication in 1956.

Lowings (P. H.). **The fungal contamination of Kentish Strawberry fruits in 1955.** —*Appl. Microbiol.*, 4, 2, pp. 84–88, 1 fig., 1956.

Studies at the Ditton Laboratory, Kent, showed that *Sphaerotheca humuli* [35, p. 873], *Botrytis cinerea* [loc. cit.], and *Mucor piriformis* [loc. cit.] (of primary importance) contributed 98 to 99·5 per cent. of the total hyphae contaminating both fresh and stored strawberries harvested in Kent in 1955. *Cladosporium herbarum*, *Penicillium* spp., and *Trichoderma viride*, though plentiful on dead tissue attached to the fruit, contributed but few hyphae. *Kloeckera apiculata* [loc. cit.] caused slow breakdown when inoculated into wounded, surface-sterilized fruit. Peracetic acid showed promise as a control agent for mould during short storage periods.

Stoddard (E. M.) & Miller (P. M.). **Control of gray mold on Strawberries under greenhouse conditions.**—*Plant Dis. Reptr*, 40, 5, pp. 443–445, 1956.

At the Department of Plant Pathology and Botany, Connecticut Agricultural Experiment Station, New Haven, single sprays of thiram (3 and 1½ lb. per 100 gals.) and dichlone (¾) before inoculation gave good control (81, 72, and 82 per cent. as against 21 per cent. for the untreated in one experiment) of grey mould (*Botrytis cinerea*) of greenhouse strawberries [35, p. 379] for 18 days. Thioneb (polyethylene thiuram sulphide), mesulphane, and norsulphane [35, p. 205], all applied once at 3 lb. per 100 gals., were equally effective for ten days (82, 91, and 90 per cent. control; untreated 35 per cent.) but were less satisfactory after 18 days.

Goheen (A. C.), McGrew (J. R.), & Smith (J. B.). **Tolerance of Strawberry plants to hot-water therapy.**—*Plant Dis. Reptr*, 40, 5, pp. 446–451, 1 fig., 1956.

At Beltsville, Maryland, Blakemore strawberry plants taken from the field during dormancy, when air temperatures were low, withstood longer periods of immersion in water at 127° F. for the elimination of pests and viruses [34, p. 532]

than plants lifted in late autumn or early spring. Hot water tolerance in plants taken between early December and early March was increased by storage at 32° F. for two weeks or longer. More plants survived the two minutes' immersion at the end of the cold storage period than the same treatment at the beginning or middle of the period. Most of the 55 strawberry varieties tested compared favourably with Blakemore in tolerance of hot water, but cold-stored plants of Howard 17, Empire, and Jumbo were less tolerant than similar Blakemore plants.

Bringhurst (R. S.) & Voth (V.). **Strawberry virus transmission by grafting excised leaves.**—*Plant Dis. Reptr.*, 40, 7, pp. 596–600, 4 figs., 1956.

At the University of California, Davis, strawberry viruses were readily transmitted by cleft grafting excised terminal leaflets from test plants to the petioles of indicator plants (*Fragaria vesca*). The scion leaflet is reduced by two-thirds, and the petiole, trimmed to a wedge, is inserted in a split in the stock petiole between the laterals, the terminal leaflet having been removed. Successful graft unions are quickly detected and the symptoms develop within two to five weeks in alpine *F. vesca*. Leaves can be grafted immediately after collecting from the field or stored in polyethylene bags for a month or more at 36° F. before grafting.

Andrade (A. C.). **Observações sôbre a Banana brasileira no mercado inglês.** [Observations on the Brazilian Banana in the English market.] —*Biológico*, 22, 10, pp. 165–176, 1956.

'Scorch' and stem-end rot (*Thielaviopsis* [*Ceratocystis*] *paradoxa*) [cf. 27, p. 100] are the principal causes of transit wastage in banana cargoes from Brazil to the United Kingdom [cf. 11, p. 727].

'Scorch' is characterized by rapidly-spreading, dark-brown, lenticular spotting of the tips of the fruit, those fingers on the outsides of the bunches being chiefly affected. Incidence is highest from February to April. The cause is believed to be over-exposure to the sun, and variations in temperature on the plantation, aggravated by refrigeration at about 11·7° C. and high humidity in the storage chambers. *Gloeosporium musarum* [loc. cit.] is usually found in the lesions.

T. paradoxa affects 60 to 70 per cent. of stems and also induces knuckle-rot and finger-rot [loc. cit.]. Spraying with shirlan is recommended.

Rocchetti (G.). **La Bananicoltura della Somalia (continuazione e fine).** [Banana cultivation in Somaliland (continuation and conclusion).]—*Riv. Agric. subtrop.*, 50, 4–6, pp. 165–197, 6 figs., 1 graph, 1956. [English summary.]

This paper includes a brief section on fungal diseases of the banana in Somaliland, based on Castellani's recent monograph on the subject [35, p. 905].

Rehm (R. S.). **Zinc deficiency in Pineapples.**—*Fmg in S. Afr.*, 32, 8, pp. 20–21, 2 figs., 1956.

Chlorosis of pineapples in Swaziland, was attributable to zinc deficiency [cf. 35, p. 719], which may be corrected by sprays of zinc sulphate, 0·1 to 0·4 per cent., according to the quantity of solution used for a given area.

Bingham (F. T.) & Beutel (J. A.). **Iron chlorosis and chelate studies.**—*Calif. Citrogr.*, 42, 2, pp. 63–65, 1956.

In a survey carried out by the University of California Citrus Experiment Station in Southern California chlorosis of avocado trees was found to be associated with leaf iron concentrations of less than 40 p.p.m., the condition being widespread only on the predominantly calcareous soils of the coastal regions of Los Angeles and Orange counties.

In subsequent field tests chlorotic trees did not respond to soil applications of Fe-DTPA [35, p. 674] but another chelate, Chel 138–HFe [composition not given] gave promising results when applied at 1 lb. per tree.

Ciferri (R.), Rui (D.), Scaramuzzi (G.), Candussio (R.), & Bonfante (S.). **La 'leptonecrosi' da borocarenza dell' Olivo. Parte II. Parte III.** ['Leptonecrosis' of the Olive caused by boron deficiency. Part II. Part III.]—*Ann. Sper. agr.*, N.S., 10, 1, pp. 25–59; 2, pp. 335–356, 25 figs., 1956. [English summaries.]

Continuing their account of their investigations into 'leptonecrosis' or 'progressive decline' of olive trees in Italy [35, p. 834], the authors review the literature dealing with the possible virus or physiological origin of this type of condition and state that all attempts by them to transmit the symptoms by grafting gave negative results. When, however, boron, alone and together with stable manure and chemical fertilizers, was applied to affected trees the condition was almost completely eliminated from the province of Verona. Treated trees which had been affected gave heavier yields than apparently unaffected, untreated ones. Injections of boron into the trunks also caused the symptoms to disappear.

The amount of boron required to effect a cure depended on the age, size, and variety of tree, the nature of the soil, and the local environmental conditions. With three-year-old trees the best results were given by applying at the end of winter 0·5 kg. ammonium phosphate, 0·2 kg. ammonium sulphate, 0·3 kg. potassium sulphate, and 17·5 gm. boric acid per tree. For trees seven to eight years old the same fertilizers were required at 1·2:0·15:0·6 kg.:28 gm., with 35 kg. stable manure, and at 40 years or more the best formula was 4·2:2·5:3 kg.:190 gm. with 120 kg. manure. Treatment should be repeated a year later if any of the symptoms are still present. Commercial borax may be substituted for boric acid if about double the quantity is used. Applications of borax at the beginning of spring in the amounts recommended may prove highly beneficial even to trees with no symptoms of deficiency.

Boron had no effect on various forms of witches' broom and leaf malformation, including sickle leaf [34, p. 605], present on affected trees; these manifestations are, therefore, considered to be unrelated to leptonecrosis. A list of 57 references is appended.

Jenny (J.). **Considérations techniques sur la pulvérisation dans la lutte antiparasitaire.** [Technical considerations on spraying in the control of parasites.]—*Annu. agric. Suisse*, (70), N.S., 5, 5, pp. 619–627, 2 figs., 4 graphs, 1956. [German, English, and Italian summaries.]

The author discusses the importance of pressure and nozzle shape on the size of fungicidal droplets and the influence of these factors on the speed and efficiency of spraying operations [cf. 34, p. 540; 35, pp. 908–910, and below, p. 269]. Various types of equipment for specific plant-protective purposes are recommended.

Ferone (A.). **Importanza ed impiego degli antiparassitari in agricoltura.** [Importance and application of pesticides in agriculture.]—*Rass. chim.*, 8, 12, pp. 25–28, 1956.

Useful information is presented on the economic importance of plant diseases and pests in Italy, the organization and execution of plant-protective operations, phytosanitary legislation, and the international situation in respect of the plant-protection campaign.

The average annual losses resulting from disease of recent years in the leading Italian crops are tabulated. The percentage reduction in 60,000,000 quintals of

wheat was 10; in 6,000,000 of rice 12; in 20,000,000 of maize and sorghum 13; in 30,000,000 each of potato and beet 15 each; in 600,000 of tobacco 20; in 10,000,000 of tomato and market-garden produce 20; in 700,000 of hemp 5; in 55,000,000 of grapes 10; in 6,000,000 each of citrus and olives 20 and 25, respectively; and in 9,000,000 of stone fruits 20.

The consumption of insecticides and fungicides from 1936 to 1938 and from 1948 to 1954 is also presented in tabular form. In 1953–4 the quantity of copper sulphate used was 912,305 q. as compared with 1,127,000 in 1936–38; of copper oxychloride 58,955 (60,150); of other copper compounds 1,618 (230); of sulphur 405,935 (374,030); of copper-sulphur 62,065 (119,940); and of iron sulphate 28,301 (9,090).

Jones (A. H.), Desmarais (J. G.), & Winfield (K. E.). **How efficient are fungicidal paints?**—Reprinted from *Canad. Paint Varn. Mag.*, *1956*, May, 8 pp., 10 figs., 3 graphs, 1956.

At the Bacteriological Division of the Canadian Department of Agriculture the efficiency of fungicidal paints [cf. 33, p. 168] was tested by treating 25 mm. squares of glass with the paint, covering these with inoculated agar media, and observing zones of inhibition after four days at room temperature. Efficiency on cold storage room walls was judged by shaking standardized swabbings from treated areas in water and plating.

In tests of 16 commercial paints, those containing di-(phenyl mercury) dodecenyl succinate were superior to chlorinated rubber base paints or those with copper-8-quinolinolate. Those containing naphthenate or other mercury salts were also efficient. Effective concentration of fungicide varies with temperature; 0·1 per cent. succinate was successful in a room at 32° F. but ineffective at 65°, while 0·25 per cent. was effective both at 37° and 65°. In general, fungicidal paints, particularly those containing organic mercury salts, showed considerable promise.

Tolerance for residues of maneb.—*Fed. Reg.*, 20, pp. 7902–7903, 1955. [Abs. in *Chem. Abstr.*, 50, 1, col. 524, 1956.]

A tolerance of 7 p.p.m. manganese, calculated as the zinc analogue, in or on produce from most crops sprayed with maneb (0·1 p.p.m. for almonds and potatoes) is established under the United States Federal Food, Drug, and Cosmetic Act [35, p. 472]. Where the same numerical tolerance is stipulated for a mixture of dithiocarbamates (ferbam, maneb, ziram, and zineb) on a raw agricultural commodity, the total amount of metallic dithiocarbamate, calculated as the zinc analogue of maneb, shall not exceed the tolerance established for each.

Ark (P. A.) & Wilson (E. M.). **Availability of streptomycin in dust formulations.**—*Plant Dis. Reptr*, 40, 4, pp. 332–334, 1956.

Much of this information on the use of pyrophyllite dust–streptomycin combinations for the control of plant diseases has already been noticed from other sources [34, p. 377; 35, p. 615]. At the University of California, Berkeley, the pyrophyllites pyrax ABB and nuclay, micronized sulphur, hydrated lime, and calcium and magnesium carbonates were found to be excellent dust carriers of streptomycin, releasing it readily when in contact with water and not impairing its activity after storage (12 months for the first three and at least 30 days in limited tests with the carbonates). In the hydrated lime formulation the concentration of streptomycin was still the same two months after its preparation, and its stability was not affected by the high pH (12·7) of the lime.

In pot experiments both the nuclay and hydrated lime–streptomycin formulations gave good control of angular leaf spot (*Pseudomonas lacrymans*) of cucumber [35, p. 114] when dusted on both sides of the leaf prior to mechanical inoculation.

Gray (J. R.). **The analysis of sulphur products.**—*J. Sci. Fd Agric.*, 7, 1, pp. 3–7, 1956.

As a result of the recent development of a large number of sulphur-containing fungicides a committee was set up to formulate British specifications for these products. The information required of sprays and dusts is the percentage of sulphur, particle size, and evidence for satisfactory spraying properties, together with the rate of sedimentation.

Sulphur is generally determined by the Goodwin-Martin method [4, p. 361] which is fully described in a technical bulletin issued by the Ministry of Agriculture [31, p. 562].

Dusting properties were examined in several ways. The sulphur dust was sieved through successive British Standard meshes, 60, 120, and 240. Bulk density was estimated by dredging from a fixed height into a standard crucible, cutting the top level, and weighing the contents. Stickiness was estimated on a split glass plate, and dustiness by dispersing a known weight of material with air in a Gooch crucible and weighing the collected dust. The angle of repose, at which a heap began to collapse, was also measured.

It has frequently been shown in both laboratory and field tests that the smaller the particle size the greater the fungitoxicity of wettable sulphur [cf. 11, p. 385; 22, p. 486]; the particle size of the preparations tested ranged from below 1 μ to 10 μ diameter. The determination of particle size by the Andreasen pipette [loc. cit.] was the most reliable. The percentage of sulphur in colloidal sulphur should be 90 to 95 per cent. less than 6 μ particle size and 55 to 60 per cent. below 2 μ, while the corresponding figures for dispersible sulphur should be 40 to 45 and 9 to 10 per cent. The importance of following exactly the procedures described for preparing suspensions [31, p. 562] in order to obtain comparable results is stressed.

Gjaerum (H. B.). **Et nytt mjøldoggmiddel.** [A new remedy for mildew.]—Reprinted from *Gartneryrket, 1956*, 5, 4 pp., 1956.

Information is presented in popular terms on the results of experiments (*a*) abroad and (*b*) in Norway on the control of various mildews by spraying with karathane, also known as iscothan and mildex [32, p. 558 *et passim*]. In Norway the fungicide has proved effective against the mildews of gooseberry [*Sphaerotheca mors-uvae*: cf. above, p. 254], apple [*Podosphaera leucotricha*: cf. 35, p. 780], and rose [*S. pannosa*]. The preparation now available on the Norwegian market contains 22·5 per cent. dinitrocapryl phenylcrotonate, 2·5 per cent. other nitrophenols and derivatives, and 75 per cent. inert substances. The recommended concentrations are as follows: for apple 0·09 to 0·12 per cent., gooseberry 0·05, greenhouse cucumbers [against *Erysiphe cichoracearum*] 0·1, outdoor and greenhouse roses 0·05 to 0·06 and 0·03 to 0·05, respectively, ornamental trees and bushes 0·06 to 0·1, and herbaceous plants 0·03 to 0·05. In the writer's tests on roses a 0·04 per cent. solution of karathane caused no damage to young foliage or buds but injured open flowers. Applied two or three times after blossom, it was as effective against gooseberry mildew as Burgundy mixture and was free from the deleterious effects of the latter on leaves and berries.

Le Gal (Marcelle). **Promenades mycologiques.** [Mycological excursions.]—390 pp., 120 pl. [8 col.], 4 figs., Paris, Librairie J.-B. Baillière et Fils, 1957. Fr. 2,000.

This work, intended to serve as a practical guide for collectors of the larger fungi, is arranged as a series of excursions made at different seasons in various natural surroundings, such as gardens, parks, fields, and woods of different kinds of trees (oaks, elms, conifers, etc.). In each chapter the author describes the species

found by means of questions and answers exchanged between herself and a companion. Nearly 300 species are dealt with in this manner, 225 being depicted in line drawings and 25 in colour. Keys for determining the fungi are provided, and there are alphabetical indexes of the French and Latin names mentioned in the text.

Ingram (M.). **An introduction to the biology of yeasts.**—xiii+273 pp., 12 pl., 8 figs., 15 diags., 19 graphs, London, Pitman, 1955. 25*s*.

This book is intended as a general account of the nature and behaviour of yeasts. It emphasizes the physiological aspects of the subject, leading on from an opening chapter on the nature of yeasts to describe their metabolic processes, growth, reproduction, genetics and variation, and finally the yeast colony and its place in nature. More attention is given to the composition of yeasts than to their taxonomy and industrial uses, but the underlying principles involved in these are considered. There are cross-references in the index to the synonymy accepted by Lodder and Kreger van Rij [31, p. 567], but their nomenclature is not followed in the text. There is a list of some 270 recent references.

Hood (S. C.). **A new approach to studies on fungi.**—*Econ. Bot.*, 10, 3, pp 261–262, 1956.

In view of indications that certain soil fungi make available to plants compounds which in turn confer disease resistance upon animals feeding on them, the author suggests the following lines of research: detailed study of the soil fungus flora, particularly mycorrhizal activity, especially in areas of original soil; tests for the identification of the compounds from each fungus in extreme dilution; and determination of the action of these compounds on animals and their products.

Yarwood (C. E.). **Obligate parasitism.**—*Annu. Rev. Pl. Physiol.*, 7, pp. 115–142, 1956.

This is a comprehensive review of obligate parasitism, both in its general aspects and as exemplified by specific taxonomic groups. The main emphasis is on the activity of micro-organisms on higher plants, 254 references being cited.

Dickson (J. D.). **Diseases of field crops.**—xi+517 pp., 102 figs., New York, London, and Toronto, McGraw-Hill Book Company, Inc., 1956. 64*s*.

This second edition of the present work [27, p. 144] embodies information that has become available during the past ten years. In a new appendix the diseases are re-grouped according to their primary causal factor.

Mayer (R.). **Pflanzenschutzmaßnahmen in der Landwirtschaft in Bayern in Jahre 1956.** [Plant protection measures in agriculture in Bavaria in the year 1956.] —*Pflanzenschutz*, 8, 11, pp. 148–153, 1 map, 1956.

Particulars are given of the organization of the plant protection service in Bavaria and of the measures applied in 1956 for the control of potato blight (*Phytophthora infestans*) and beet leaf spot (*Cercospora beticola*); the extermination of the aphid vectors of potato and beet viruses; and barberry eradication to prevent the spread of black rust of cereals [*Puccinia graminis*].

Ullrich (J.). **Methoden und Probleme der Meteoropathologie.** [Methods and problems of meteoropathology.]—*Angew. Bot.*, 30, 4–5, pp. 120–124, 1956.

This is a brief survey of the literature since 1951 on the relation between meteorology and plant disease epiphytotics [cf. 34, p. 692].

Miller (P. M.). **Spectrographic analysis of water agar, potato-dextrose agar, and V-8 juice agar.**—*Phytopathology*, 46, 9, p. 526, 1956.

The metallic ion contents (p.p.m.) of the above media as determined spectrographically at the Connecticut Agricultural Experiment Station, New Haven, are set out. The copper present in the two last-named (0·31 and 0·4) would be toxic to some fungi, especially to certain phycomycetes; potassium and manganese were absent from the water agar (Difco bacto-agar), which would possibly inhibit growth of some fungi. The results indicated, however, that the superiority of V-8 juice agar [34, p. 35] lies elsewhere than in its metallic ion content.

Evans (R. M.) & Bobalek (E. G.). **Accelerated tests for mildew resistance of oil paints.**—*Industr. Engng Chem.*, 48, 1, pp. 122–125, 1956.

Studies at the Case Institute of Technology, Cleveland, Ohio, on the performances of accelerated laboratory methods in predicting mould resistance [31, p. 136] of paints showed the advantages of a modified Hutchinson test (*Rep. Off. sci. Res. Dev.* 5687, 1945), the paint being applied to fibreglass tape. The advisability of weathering the film before measuring resistance is emphasized. Films were dried in a laboratory atmosphere for two weeks before inoculation with a mixed spore suspension of *Aspergillus niger*, *A. flavus*, and *Penicillium luteum*. The samples of tape were incubated on agar and examined weekly for four weeks.

With few exceptions, results of previous service tests were confirmed.

Rhodes (A. R.). **Antibiotics are new weapons for the grower.**—*Agric. Rev.*, 1, 8, pp. 44–47, 1956.

This is a brief review of the history of the control of plant diseases by antibiotics [35, p. 914 and next abstract]. The majority of the 22 references have been noticed in this *Review*.

Lees (K. A.). **Antibiotics in agriculture.**—*Chem. & Drugg.*, *1956*, 165, pp. 238–239, 4 figs., 1956.

The advantages of the use of antibiotics in the control of plant diseases [see preceding abstract] are briefly enumerated. Examples of their employment in controlling bacterial diseases are given, all of which have been noticed in this *Review*. Among the anti-fungal antibiotics at present being developed are cycloheximide [actidione: 35, p. 927] which has a wide anti-fungal scope but is costly to produce and has a narrow margin between the effective and phytotoxic concentrations; helixin [34, p. 447] and endomycin [30, p. 482], which are mixtures of several biologically active components, while the polypeptide toximycin [32, p. 687] is the result of a specific search for suitable antibiotics.

Ciferri (O.) & Ciferri (Fiorella). **Attività antibiotica di species fungine non usuali.** [The antibiotic activity of unusual fungal species.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, 13, 1–3, pp. 84–94, 1955. [English summary.]

An investigation at the Botanic Institute and Cryptogamic Laboratory, University of Pavia, Italy, of the antibiotic activity of 74 strains of 72 species of fungi, as displayed against a total of 10 strains of fungi, yeasts, and Gram-positive and Gram-negative bacteria, showed that 59 of the strains tested were antibiotically active. Twenty-seven strains were active against fungi only, 10 against bacteria only, 12 against both, 4 against both fungi and yeasts, and 6 against fungi, bacteria, and yeasts. No strain was active against yeasts alone.

The antibiotic properties appeared to be unrelated to the habitat, or biological characters of the fungi. All the human and animal pathogens tested showed some antagonism, mostly to other fungi, while 80 per cent. of the plant pathogens, semi-parasites, and soil saprophytes were to some extent similarly active.

Nisikado (Y.), Inouye (T.), & Okamoto (Y.). **Studies on the microorganisms producing antibiotics effective to plant pathogens. I. Streptomyces sp. 30–10 and its antibiotic.**—*Ber. Ōhara Inst.*, 10, 4, pp. 229–240, 2 graphs, 1956.

Streptomyces sp. 30–10, isolated from the mud of a house wall at Kurashiki, Japan, in 1953, secretes in liquid media, e.g., potato decoction, wheat bran extract, and glucose broth, an apparently new antibiotic which inhibited the growth of various plant pathogens at relatively low concentrations in tests carried out by the cup, agar streak, and slide methods. The minimal inhibitory levels (in dilution units per ml., one unit being the minimal concentration required to inhibit 99 per cent. spore germination of *Gibberella maydis*) for a number of species are tabulated, including *Alternaria solani* (2·4 to 4·8), *Botrytis* [*Beauveria*] *bassiana* (6 to 12), *Colletotrichum lagenarium* and *C. lindemuthianum* 1·5 to 3 and 0·6 to 3, respectively, *Gloeosporium nelumbii* [35, p. 145] 3 to 6, *Fusarium bulbigenum* var. *nelumbicolum* [loc. cit.] and two strains of *F. lini* 6 to 12, *Gibberella maydis* No. 2089, 0·6 to 1·5, Nos. G 42 and 2361, 2·4 to 4·8, *Piricularia oryzae*, *Rhizoctonia* [*Corticium*] *solani*, and *Sclerotinia libertiana* [*S. sclerotiorum*] 4·8 to 9·6, and *S. minor* < 5.

Crude 30–10 substance, extracted with benzene and acetone, was soluble in methanol, ethanol, butanol, amyl acetate, ether, and chloroform, and with difficulty in water and petroleum ether. It is stable at room temperature except in solutions of extreme acidity or alkalinity, and the antibiotic potency of the culture filtrate was not impaired by five days' incubation at 33° C.

Rose (A.), Hutchison (A. W.), Hayes (J. R.), & Sharkey (Irene R.). **The estimation of copper-8-quinolinolate in mildewproofed fabrics.**—*Amer. Dyest. Reptr*, 45, 12, pp. 362–364, 1956.

The method used at the Applied Science Laboratories, Inc., State College, Pennsylvania, for the estimation of copper-8-oxyquinolinolate in mould-proofed fabrics [cf. 34, p. 47; 36, p. 47, *et passim*] is based on the photometric determination at 410 mμ of the fungicide in chloroform solution. The chemical is removed from the material by boiling the sample for a short time in 10 per cent. sulphuric acid. The pH of the solution is then adjusted to about 6 and the copper-8-quinolinolate extracted with chloroform. A standard curve for comparison is prepared by measuring transmissions of known concentrations of the compound in chloroform.

No interference was encountered from the simultaneous presence in the material of copper naphthenate, copper hydroxynaphthenate, and the water- and fire-repellent substances in ordinary use.

Galloway (L. D.). **Microbiological evaluation of rot-proofing treatments.**—*Text. in Ind.*, 1, 6, pp. 65–68, 1 fig., 1956.

In this semi-popular article on rot-proofing treatments of textiles against micro-organisms [cf. 35, p. 314; 36, p. 47] the author distinguishes between mould-proofing against fungal growth on fabrics in normal storage and rot-proofing to give protection against exposure to soil and weather. Soil exposure [cf. 35, p. 211] affords a good test against rot-proofing, but is difficult to standardize. Pure culture techniques, mainly used with cellulose textiles [cf. 31, p. 394], have some advantages, but the necessary pre-sterilization of the fabric introduces a number of factors, and the specific behaviour of individual fungi under the test conditions may be misleading.

Sampling methods, interpretation of strength tests, and resistance to leaching are discussed. No successful test for general application has yet been devised and the need for agreement on basic principles to which tests should conform is stressed.

Yeager (C. C.) & Seith (R. T.). **Fungicides for products of the paper industry.** - *Tappi*, 39, 8, pp. 557–569, 12 figs., 2 graphs, 1956.

A comprehensive survey of the historical background of fungicidal treatments

for slime control in the paper industry, citing 14 contributions to the literature on the subject, and of important new developments in this field is presented in a joint contribution from the Scientific Oil Compounding Co., Inc., Chicago, and the Mosinee Paper Mills Co., Mosinee, Wisconsin. Because of their comparatively high cost, these preparations have not found wide acceptance for the treatment of speciality papers until the past decade, during which new markets have been established by a leading kraft producer. The requirements for durability are most effectively met by copper and zinc complexes, which are easily applied, while controls can be satisfactorily maintained to ensure adequacy and economy. Exceptionally durable paper products are now available at prices justifying their use for a wide range of industrial purposes.

Existing test procedures are regarded as insufficiently exacting, and experiments were accordingly carried out to determine the capacity of five compounds rated highly in numerous assays since 1951 to protect kraft papers (including polyethylene-coated barriers [36, p. 47]) exposed to accelerated weakening conditions involving (1) two hours' baking at 250° F.; (2) 24 hours' leaching; and (3) 100 hours in the weatherometer [loc. cit.]. Judged both by the 14-day soil burial and 14-day Petri dish mixed spore tests, 0·25 per cent. solubilized copper-8-quinolinolate was the most effective. Heat, sunlight, and (in one series) leaching reduced the efficiency of 1 per cent. pentachlorophenol. Zinc salts of dimethyldithiocarbamate and 2-mercaptobenzothiazole (1 per cent.) and 2 per cent. copper pentachlorophenate were only moderately resistant to leaching, while 1·5 per cent. orthophenylphenol failed under all conditions.

The preservation of coatings and sizes is a comparatively new aspect of microbiological control in the paper industry. The use of 2,2′-dihydroxy-5,5′-dichlorodiphenylmethane and cumilate [34, p. 45] in adhesives for milk cartons has recently been authorized by Syracuse University in co-operation with the Food and Drug Administration. In connexion with paper sizing a special proprietary formulation of orthobenzylparachlorophenol at a strength of 25 to 30 p.p.m. has lately given promising results in the preservation of starch.

Kaltenbach (J.). **Über Bakterien- und Pilzarten, Schleimbildung und -verhütung bei der Faserstoff-Verarbeitung.** [On species of bacteria and fungi, slime formation and prevention in cellulose processing.]—*Wbl. Papierfabr.*, 84, 8, pp. 267–276, 19 figs., 1 graph, 1956.

Although cocci are the principal agents of slime formation in German pulp mills, [unspecified] fungi are also frequently concerned in the process where stagnant water collects. The optimum temperature for their growth usually ranges from 20° to 30° C. Slime formation was prevented in experiments at the firm of Hoesch-Chemie, Düren, by the addition of one dose daily of 200 to 250 gm. durbasan (a modified phenyl mercury acetate) [cf. 34, p. 800] per 35 tons pulp; after six hours the chemical could no longer be detected in the white water. In a hardboard mill in which 0·1 per cent. durbasan (based on pulp weight) was added to the beater, the finished product remained sterile for three months at room temperature and on exposure to the air.

Fuchs (W. H.). **Ein Beitrag zur pathologischen Physiologie.** [A contribution to pathological physiology.]—*Angew. Bot.*, 30, 4–5, pp. 141–146, 1956.

The author reviews in general terms the principal lines along which host-parasite relationship may be studied [cf. 34, p. 111], mentioning (*a*) observations of the growth of the pathogen in infected tissue and the way in which this is affected by infiltration of the tissue with metabolites and metabolic inhibitors [cf. 35, p. 321]; (*b*) gas exchange studies carried out in conjunction with such work; and (*c*) biochemical investigation of infected tissues at intervals during the course of infection.

He refers very briefly to his own work, a comparative study of the growth of a race of *Phytophthora infestans* in a resistant and a susceptible potato variety, which is to be reported fully elsewhere.

KOHLMEYER (J.). **Über den Cellulose-Abbau durch einige phytopathogene Pilze.** [On the degradation of cellulose by some phytopathogenic fungi.]—*Phytopath. Z.*, 27, 2, pp. 147–182, 4 figs., 1 diag., 3 graphs, 1956.

At the Institute of Plant Physiology of the Free University, Berlin, the author made an intensive study of cellulose disorganization and cellulase production by 11 cultures of fungi, using a special gravimetric method of quantitative determination involving growth on 'phriphan' cellulose hydrate disks 0·04 mm. in thickness. On this basis the organisms, mostly isolated at scientific institutions in Berlin, fell into three groups. The first was represented by a species of *Fusarium* from foot-rotted wheat; *Gloeosporium nervisequum* [*Gnomonia platani*] from spots on the leaf veins of *Platanus* sp. (Italy); *Pestalotia funerea* from foliar lesions on *Araucaria bidwillii* (Italy); *F.* sp. from a *Musa* fruit; *Alternaria tenuis* secondary to *Cercospora* [*beticola*] on sugar beet leaves; and *Gloeosporium elasticae* from leaf spots on *Ficus elastica*, all of which adhere firmly to the disks, a few hyphae penetrating the membranes and continuing to grow inside them parallel with the surface. The second group comprised four isolates of *Botrytis cinerea*, one each from leaf spots on *Hosta coerulea*, *Polygonatum japonicum*, and oak (*Quercus sessilis*), and one from an old cyclamen flower [34, p. 152], the hyphae of which form grooves on the cellulose surface but never penetrate to the interior. *Rhizoctonia* [*Corticium*] *solani* from a potato sprout was the only member of the third group: its mycelium lies loosely on the membranes, neither penetrating nor forming grooves.

The parallel growth of the organisms in the first category may be explained by the structure of the cellulose membranes, the micellae of which are disposed in parallel form in the longitudinal direction of the viscose disks. The amorphous regions of the cellulose were evidently preferred for disorganization, resulting in horizontal hyphal growth and isolation of the crystalline areas. The isolates of *B. cinerea* and *C. solani* in groups two and three, respectively, all formed sclerotia. In an experiment in which the inoculum was separated from the cellulose membrane by perforated sheets of aluminium in Knop's solution in Petri dishes, the latter species was shown to be capable of forming large quantities of cellulase [36, p. 56] without direct contact with the cellulose substratum, which nevertheless served as the sole source of carbon. All the fungi were able to degrade natural celluloses (sunflowerand elder medulla). Cellulose nitrates, however, in the form of either collodion disks or membrane filters, were absolutely resistant to enzymatic degradation.

The mode of cellulase secretion was investigated in *C. solani*, *B. cinerea* (cyclamen strain), and *Neocosmospora vasinfecta*, originally isolated from lucerne in South Africa. In the simultaneous presence of water-soluble carbohydrates and cellulose the former were utilized first, while non-water-soluble starch was also preferred by *C. solani*. In the simultaneous presence of cellulose and increasing doses of glucose up to 3 per cent., cellulase secretion began at glucose concentrations below 0·5 per cent. In all the experiments from 0·3 to 0·5 per cent. of the cellulose was decomposed.

GRAINGER (J.). **Host nutrition and attack by fungal parasites.**—*Phytopathology*, 46, 8, pp. 445–456, 2 figs., 10 graphs, 1956.

In this contribution from the West of Scotland Agricultural College, Auchincruive, Ayr, the term 'disease potential'—suggested by, but not the same as, Beaumont's 'epidemic potentiality' [13, p. 469]—denotes the relative physiological aptitude of a host crop or plant to contract disease at different stages of its life-

history. For instance, oats traverse two well-marked periods of high disease potential in respect of leaf spot *Helminthosporium* [*Pyrenophora*] *avenae* [34, p. 637], the primary and secondary phases being separated by an interval of low potential. Potatoes have been shown to behave similarly in relation to blight (*Phytophthora infestans*) [29, p. 529]. Carbohydrate, nitrogen, and ash were estimated in both hosts to determine whether changes in nutrition or composition would account for such variations in response to infection by the pathogens.

Periods of low disease potential in both hosts coincided with maximum rapidity of growth and a low percentage of total carbohydrate in the whole plant and vice versa. The combined effects of these two factors were assessed by calculating the 'C_p/R_s' ratio, i.e., the weight of total carbohydrate in the whole plant (C_p) divided by the residual dry weight of the shoot (R_s). High ratios were shown to be correlated with high disease potentials and vice versa. Further tests of this relationship involved the cultivation of Star oats and Kerr's Pink and other potato varieties at different times of year so that plants with widely divergent ratio values grew close to one another. When infection occurred it developed rapidly and severely on high-ratio hosts and only slightly or not at all on those with low ratios.

'Zero time' in blight prediction [cf. 32, p. 585 *et passim*] denoted the moment at which ratios began to rise and the crop to become increasingly liable to contract epiphytotic infection. The higher the ratio values involved, the higher were the rates of blight development, and conversely. The intermediate ratio values of 'dormant' tubers corresponded to a similar disease potential in comparison with that of the growing plant. Ratio values demarcating healthy from pathological conditions in the latter were roughly 1, 2, and 4 to 5 for Kerr's Pink, Arran Pilot, and Dunbar Rover potatoes and 0·5 to 1 in oats. They were found to be unconnected with inherent varietal susceptibility.

YARWOOD (C. E.). **Humidity requirements of foliage pathogens.**—*Plant Dis. Reptr*, 40, 4, pp. 318–321, 1 diag., 1956.

At the Department of Plant Pathology, University of California, Berkeley, foliage pathogens were classified into four types according to their humidity requirements at different stages in their life cycles, viz., the anthracnose type, requiring high humidity during inoculation, incubation, and sporulation, but not during infection, the downy mildew type (during incubation and sporulation), the rust type (during incubation only), and the powdery mildew and virus type where high humidity is not required at any stage.

Quantitative information was obtained on the relation of humidity to sporulation of *Colletotrichum lindemuthianum* (cf. *Bull. La agric. Exp. Sta.* 119, 1910) on bean [*Phaseolus vulgaris*] by exposing one inoculated leaf of each plant to greenhouse conditions and keeping the opposite attached leaf in a moist chamber at night. The total number of spores per leaf was determined daily from five to eight days after inoculation. The average increase in spore production due to high humidity was 3,230 per cent. as against only 52 per cent. for bean rust (*Uromyces phaseoli*) [*U. appendiculatus*].

PREVITERA (A.) & TREGGI (G.). **Azione della vitamina K_5 su Sclerotium rolfsii Sacc.** [The action of vitamin K_5 on *Sclerotium rolfsii* Sacc.]—*Ann. Sper. agr.*, N.S., 10, 1, pp. 195–206, 4 graphs, 1956. [English summary.]

The results of studies at the Institute of Agricultural and Technical Microbiology, University of Pisa, confirmed the view that vitamin K_5 inhibits sclerotial germination in *Sclerotium rolfsii* [33, p. 45]. The effect ranged from retardation with 0·05 per cent. of the vitamin and six hours' contact to complete inhibition with 0·5 per cent. and 48 hours' contact.

Stevenson (F. J.), Akely (R. V.), & Haynes (F. L.). **Plymouth, a new variety of Potato immune from the common race of the late blight fungus, moderately resistant to common scab, and adapted to the tidelands of North Carolina.**—*Amer. Potato J.*, 33, 10, pp. 296–299, 1956.

Details are given of the potato variety, Plymouth, released in April, 1955, by the United States Department of Agriculture and the Agricultural Experiment Station of the University of North Carolina, Raleigh. It is immune from the common race of blight [*Phytophthora infestans*: see below, p. 270] and showed moderate resistance to scab [*Actinomyces scabies*: 35, p. 391] in tests in Maine, Michigan, Minnesota, Wisconsin, and Wyoming. In these and other respects it is superior to Irish Cobbler and should largely replace this variety in eastern North Carolina, where it is classified as early-maturing.

Baerecke (Marie-Luise). **Ergebnisse der Resistenzzüchtung gegen das Blattrollvirus der Kartoffel. I. Mitteilung.** [Results of breeding for resistance to the leaf roll virus of the Potato. Note 1.] –*Z. Pflanzenz.*, 36, 4, pp. 395–412, 1 graph, 1956.

In this expanded account of recent experiments in connexion with a project of breeding for resistance to potato leaf roll virus at the Max Planck Institute for Breeding Research, Voldagsen, Hanover, Germany [cf. 34, p. 806; 35, p. 481], a method of inoculation is fully described which provided an 'infection climate' approximating to the ideal for uniform and reliable infection year after year, such as develops spontaneously in the most advanced degeneration areas [cf. 34, p. 668 *et passim*]. The initial material comprised field-resistant clones based on the wild species *Solanum andigenum*, *S. acaule*, *S. demissum*, and *S. chacoense*. On an average the progeny of 24 combinations of crosses between resistant plants of different clones were 18 per cent. resistant, but in three combinations values of 30 to 40 per cent. were reached. Since resistant individuals occur in crosses between resistant clones and commercial varieties (5 to 8 per cent. in one experiment) it is argued that some at any rate of the factors in the polygenic system conditioning resistance must be dominant.

Emilsson (B.) & Gustafsson (N.). **The influence of Potato virus X on yield, tuber size and chemical composition of the tubers.**—*Acta Agric. scand.*, 6, 4, pp. 369–382, 1956.

In field experiments in different parts of Sweden from 1951 to 1955 a medium severe strain, X^Y, of potato virus X [cf. 27, p. 441] decreased the yield of Bintje potatoes by an average of 16·8 per cent. and of Eigenheimer by 13·9, while a very mild strain, X^M (both strains were from Rothamsted) [28, p. 78], caused a decrease in Bintje of 20·1. Decrease was less in plants harvested immature. The differences between X^Y and X^M were significant in certain experiments but not in all. It is concluded that yield decrease by X-infection [cf. 33, p. 109] is influenced by environmental conditions and is due to reduction in tuber size (which occurs irrespective of variety, virus strain, and time of harvest) and number per plant.

In both varieties and with both virus strains there was some reduction of dry matter and starch in the tubers; the nitrogen content was higher in infected than in healthy stocks.

Bagnall (R. H.), Larson (R. H.), & Walker (L. J.). **Three virus components of 'interveinal mosaic'—Irish Cobbler Potato.**—*Amer. Potato J.*, 33, 9, pp. 271–273, 1956.

The authors report that potato viruses S and X [cf. 35, p. 536] were present in all Irish Cobbler material examined, whether 'healthy' or infected with interveinal mosaic [34, p. 55]. When sap from the virus-X immune potato seedling 41956,

infected with interveinal mosaic from Irish Cobbler, was inoculated into a strain of *Datura metel* the development of local necrotic lesions was followed by systemic yellow spotting, acropetalous leaf-drop, and death. Sap from the upper leaves of the inoculated *D. metel* was then inoculated into a young potato seedling, from which sap was in turn removed 30 days later and inoculated into a number of test hosts. The results suggested that passage through *D. metel* had eliminated virus S, leaving the interveinal mosaic factor or potato virus M.

Rabbit antisera specific for viruses M and S, respectively, were used in a preliminary study of the host ranges of the two viruses, and though the viruses appeared to have some serological component in common they were readily distinguished when the antisera were diluted. It was also found that virus M became systemic in eggplant and tomato but not virus S, the reverse occurring with *Physalis philadelphica*.

Mezzetti (A.) & Raffi (G.). **Una maculatura bruna interna dei tuberi di Patata. II. Influenza di alcuni fattori ambientali sull' incidenza dell' alterazione. Prove orientative.** [An internal brown spot of Potato tubers. II. The influence of some environmental factors on the incidence of the condition. Preliminary tests.]—*Ann. Sper. agr.*, N.S., 10, 1, pp. 207–251; 2, pp. 357–372; 2 pl., 2 figs., 3 diags., 4 graphs, 1956. [English summaries.]

Further studies carried out in 1952 and 1953 at the Experimental Laboratory of Plant Pathology, Bologna, on an internal brown spot [? internal rust spot: 35, pp. 226, 923] of potatoes are described in detail. Observations in the field indicated that there are no leaf symptoms and that large tubers are more susceptible than small ones. Lesions are particularly common in long tubers, generally near the extremity, which suggests that some correlation may exist between the factors responsible and those causing second-growth malformations. The condition is not transmitted from the mother- to the daughter-tubers and did not appear to be strictly correlated with either high or low soil moisture or with depth of the tubers in the soil. Straw mulching and the climatic conditions prevailing at high altitudes appreciably decreased prevalence.

In laboratory experiments the characteristic internal lesions could not be reproduced in tubers buried in damp sand and submitted to periodical warming. In a few tubers with incipient lesions at the crown end, the osmotic values near the lesions were higher than those at the stem end of the same tuber and those in the crown end of slightly withered tubers without lesions.

From the data obtained and the general features of the condition it is tentatively concluded that the lesions are caused by 'sap shock', which occurs when a plentiful flow of sap suddenly passes into the withered tissues of the tubers.

Nugent (T. J.). **Soil treatments with PCNB (terraclor) for control of Potato scab.**—*Plant Dis. Reptr*, 40, 5, p. 428, 1956.

Field trials were carried out in 1955 at the Virginia Truck Experiment Substation, Onley, to test the effectiveness of PCNB (pentachloronitrobenzene) against potato scab (*Streptomyces* [*Actinomyces*] *scabies*) [36, p. 62] under eastern Virginia conditions. The dust was applied to the open furrows at 58, 116, and 174 lb. active material per acre, and then worked into the soil, cut tubers of Cobbler being hand-planted the same day. Scab was reduced from 50·7 (no treatment) to 29·3, 29·7, and 36, respectively, in a scale 0 to 100 (all potatoes severely scabbed). That the higher rates of application were not correspondingly more efficient was possibly due to lack of thorough mixing of the material into the soil.

Olgyay (M.). **Fertőzési vizsgálatok Colletotrichum atramentarium-mal Burgonyán.** [Infection experiments with *Colletotrichum atramentarium* on Potatoes.]—

Agrártud. egy. Évkön., 2 (*Agrártud egy.*, 15), 1, pp. 195–204, 6 figs., 1951. [Russian and English summaries. Received November, 1956.]

In pot experiments carried out in Hungary inoculation of sprouting tubers of the potato variety Ella by placing pure cultures of *Colletotrichum atramentarium* [31, p. 81] on the cut surface or in wounds, and of the rooted sprouts (without the tuber) through the unwounded roots resulted in infection, the stem base and roots being destroyed. The fungus was recovered from the diseased parts. To differentiate it from other potato wilts the common name suggested for the *C. atramentarium* disease is 'basal stem rot', its most characteristic symptom.

Ferenczy (L.) & Gulyás (S.). **Untersuchungen über die künstliche Peridermbildung der Kartoffelknollen.** [Investigations of artificial periderm formation in the Potato tuber.]—*Acta biol. Szeged* (formerly *Acta Univ. Szeged*), N.S., 2, 1–4, pp. 23–27, 3 figs., 1956.

From the Institute of Plant Physiology, University of Szeged, Hungary, the authors report that potato tuber pieces, sprayed with or dipped in a mixture of 0·5 per cent. tannin and 1 per cent. formalin and then dried for 48 hours, were still healthy 14 days after planting in sand infested with *Erwinia carotovora* and other [unspecified] proteolytic bacteria, whereas there was infection at the cut surface in 90 per cent. of the untreated. Treated pieces were likewise affected when the drying, which stimulates cork production, was omitted. The effects of the process were threefold, including (*a*) artificial necrosis with disinfectant impregnation of the surface layers. (*b*) intense meristematic activity below the necrotic layer, and (*c*) an increase of cork deposition in the cells immediately below the necrotic area.

Waggoner (P. E.). **Chemical treatment of Potato seed in Connecticut 1955.**—*Plant Dis. Reptr*, 40, 5, pp. 411–413, 1956.

In experiments at the Department of Plant Pathology and Botany, Connecticut Agricultural Experiment Station, New Haven, none of the fungicides tested affected the activity of streptomycin against *Erwinia carotovora* either *in vitro* or on potato slices [cf. 33, p. 444]. While streptomycin did not affect the toxicity of fungicides to *Fusarium sambucinum* f. 6 [*Gibberella cyanogena*: 35, p. 921] *in vitro* it increased the susceptibility of potato slices to the fungus. Mycelial growth on the slices was, however, reduced by captan, dichlone (both at 1,250 p.p.m.), and rimocidin (1,000 p.p.m.) in both the presence and absence of streptomycin. The antibiotic had no effect on emergence and yield of potatoes in the field, indicating that bacterial and fungal decays were unimportant in the Connecticut uplands in 1955.

Gallegly (M. E.). **Potato fungicidal spray trials in West Virginia. 1950–1955 results.**—*Amer. Potato J.*, 33, 9, pp. 274–280, 1956.

The author reports the results of spray trials against early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) of potatoes from 1950 to 1955 in West Virginia, a region of heavy rainfall and persistent fogs and dews [cf. 26, p. 314]. Spraying was carried out six to eight times at weekly intervals, commencing in mid-June. The crops were examined twice each season for percentage defoliation, and at harvest the total yield and the yield of U.S. No. 1 grade tubers were recorded. DDT was added to all spray mixtures (1 lb. per 100 gals.). Yearly results are tabulated in detail. Zineb (65 per cent.) and maneb (70 per cent.) gave the best control of defoliation and the highest yields. Nabam with zinc sulphate (2 qts.–$\frac{3}{4}$ lb.) was in general about as effective as zineb. A number of fixed copper fungicides differed only slightly in performance. Bordeaux mixture (8–4–100) controlled the diseases well but reduced yield by damaging the plants. Captan and vancide 51 ZW were as effective as the copper fungicides, but less so than zineb and maneb.

Various split schedule or tank mix formulations with zineb were in no way superior to zineb alone.

Zeck (W.). **Untersuchungen über den Einfluß des Kupfers auf die Kartoffelpflanze und über seine fungizide Wirksamkeit im Pflanzeninnern.** [Studies on the influence of copper on the Potato plant and on its fungicidal activity in the interior of the plant.]—*Phytopath. Z.*, 27, 4, pp. 353–404, 1 fig., 1 diag., 11 graphs, 1956.

Following a concise survey of nearly 100 contributions to the relevant literature, some of which have been noticed in this *Review*, the author indicates the methods and fully describes and tabulates the results of recent investigations at Bonn and Wahn, Rhineland, Germany, on (*a*) the influence of copper-containing fertilizers on the growth of potatoes, (*b*) the uptake of copper by the plants, and (*c*) its inactivation in the host [cf. 32, p. 271] in relation to the control of *Phytophthora infestans*.

Soil amendments with copper sulphate were found to delay emergence, reduce shoot length, and postpone maturity of the stand by up to three weeks, with a correspondingly belated dying-off. The effects on yield of dosages up to 800 kg. per ha. varied in different soils: in a pot experiment in 1954, for instance, production was raised in clay but not in sand. In field experiments the influence of copper fertilizers was operative only in the year of application. They reduced the incidence of blight at the cost of heavy losses in yield, attributable to modifications in growth habit and in the microclimate.

In general, the assimilation of copper increased with the amount available and was relatively highest in young plants. Within the plant it is firmly fixed to nitrogenous substances, normally in the ratio of $\frac{1}{2}\gamma$: 1 mg. In water culture experiments tolerance of copper (as copper sulphate) outside the plant ranged from 0·2 to 0·5 mg. per l., the corresponding level for the interior being 1γ per mg. nitrogen. Copper-complex (sodium salt of copper-ethylenediamine-tetra-acetic acid) caused no damage to the plants in nutrient solution at a dosage of 80 mg. copper per l. or when taken up to the extent of 25 times the normal content. There was no indication that substantial amounts of ionized copper reached the plant through either the roots or the leaves.

The copper within the plant, whether absorbed through roots or foliage, exerted no fungicidal action on *P. infestans*, and there was no reduction of infection in detached leaves the copper content of which was raised 40-fold by placing in copper solution. The LD 50 for a strain of *Alternaria tenuis* was determined for an aqueous copper sulphate solution and for a solution of the same concentration in expressed sap. The value for the latter (1,375γ copper per ml.) was 10^3 higher than that for the aqueous solution. As the effective concentration in sap is more than 100 times the amount tolerated there can be no question of systemic copper treatment, so that any copper soil amendments beyond the amounts required to counteract deficiency are unjustifiable.

Aebi (H.), Trivelli (G.), & Staehelin (M.). **Influence du mode de pulvérisation des bouillies fongicides dans la lutte contre le mildiou de la Pomme de terre.** [Influence of the method of application of fungicidal sprays on the control of Potato blight.]—*Annu. agric. Suisse*, (70), N.S., 5, 5, pp. 629–640, 5 figs., 1956. [German, English, and Italian summaries.]

A tabulated survey is given of trials at the Lausanne Agricultural Experiment Station to determine the relative efficiency of two types of machine [cf. above, p. 256] in the control of potato blight [*Phytophthora infestans*] with copper-containing compounds, namely, an ordinary spray boom with three nozzles per row, one in the centre and one on each side above the plants, and an air blast low-volume sprayer

(1954 model). While the concentration of copper was kept constant, three amounts of spray liquid (copper carbonate, copper oxychloride, or copper oxide) were used, viz., 950 and 450 l. per ha. in the tests with the spray boom and 300 l. in those with the air blast machine.

The efficacy of the treatments was rated by two methods, the British Mycological Society's assessment key [32, p. 584] and Trivelli's leaf print technique [cf. 29, p. 38; 36, p. 43]. It was concluded that the spray boom is the better of the two types of equipment for potato blight control, whatever the quantity of liquid used.

Müller (K. O.), Cullen (J. C.), & Kostrowicka (Mme M.). **Testing 'true resistance' of the Potato to blight, Phytophthora infestans.** —*J. nat. Inst. agric. Bot.*, 7, 2, pp. 341–354, 2 pl., 1 diag., 1955.

Descriptions are given of the laboratory and greenhouse methods used at the National Institute of Agricultural Botany, Cambridge, for testing the 'true resistance' (due to suprasensitivity) of potato varieties and seedlings to blight (*Phytophthora infestans*) [cf. 35, pp. 88, 629] on tubers, sprouts, leaves, and other parts of the plant and of the reaction of various tissues to different strains of the fungus. The fungus may be isolated readily from diseased leaves by touching the freshly cut surface of a tuber of a variety such as King Edward (susceptible to all blight strains) with a piece of diseased leaf bearing sporangiophores. Three to five days later (at 15° to 20° C.) a mycelium with sporangiophores develops on the inoculated surface. Transfers to fresh tubers for maintaining stock cultures are made by picking up sporangia or sporangiophore tips with forceps and washing them on to the cut surface, and should be repeated every five to seven days. A large number of isolates can be kept over a period of time on whole tubers stored at 7° to 90°, but transference to fresh tubers at six-week intervals is necessary. Zoospore suspensions are preferable to sporangia for testing [25, p. 138]. A table is given indicating the type of inoculation and incubation period for the different parts of the plant at different stages of development, with the symptoms that are likely to develop.

The results of tests on detached leaves and on tubers indicate that four main types of reaction (which are described) may be distinguished in each. Experience has shown that varieties giving type 1 or type 2 leaf reaction in the greenhouse do not develop blight in the field and those with type 3 escape infection at epidemic level. In the field the tuber may be infected at any point except the undamaged periderm. Resistance due to suprasensitivity can only be tested by direct application of the fungus to the tissues. The sprouts of varieties with resistant tubers, or with resistant foliage but susceptible tubers, always give a suprasensitive reaction. A variety under test should be subjected to a variety of methods to gain a true picture of its resistance. Field tests indicate that new strains of the fungus are more likely to occur with late planting. The common strain of *P. infestans* was grown for 107 generations, and the B strain for 34, on tomato without alteration of pathogenicity.

The authors conclude that *P. infestans* is by no means a 'plastic' parasite and that the rapid accumulation of all the available genes which control resistance is essential for blight control.

Pristou (R.) & Gallegly (M. E.). **Differential reaction of Potato hosts to foreign and domestic Potato physiologic races of Phytophthora infestans.**—*Amer. Potato J.*, 33, 10, pp. 287–295, 1956.

This is an expanded account of a comparison of races of *Phytophthora infestans* on potato carried out at the West Virginia Agricultural Experiment Station, Morgantown. A preliminary abstract has already been noticed [34, p. 808].

Waggoner (P. E.). **Variation in Verticillium albo-atrum from Potato.**—*Plant Dis. Reptr*, 40, 5, pp. 429–431, 1 diag., 1956.

At the Department of Plant Pathology and Botany, Connecticut Agricultural Experiment Station, New Haven, wide differences in pathogenicity to Kennebec and Saranac potatoes were observed within as well as between microsclerotial and non-microsclerotial types of *Verticillium albo-atrum* [35, p. 922] and within as well as between the four mass isolates studied. The relative pathogenicity of four single-spore isolates varied within one year. Morphology and pathogenicity were not correlated, and there was no distinct evidence of specificity of isolates for Kennebec, Saranac, or the more resistant Houma. Some of the differences in varietal resistance occurring from one region to another are probably due to races of the pathogen, and it is likely that strains exist or will arise that may attack resistant varieties.

Holmes (F. O.). **Elimination of foliage spotting from Sweetpotato.**—*Phytopathology*, 46, 9, pp. 502–504, 1 fig., 1956.

At the Rockefeller Institute for Medical Research, New York, $\frac{1}{4}$-in. tip cuttings of Bunch Porto Rico sweet potato plants with the chlorotic leaf spotting associated with internal cork disease [cf. 35, p. 923] were grafted on to young seedlings of Heavenly Blue *Ipomoea tricolor* and Giant White *Galonyction aculeatum*. Those scions which then developed unspotted were subsequently rooted independently early in 1953 and maintained till 1954, only three of them developing spots. The plants which developed no spots were further increased by propagation and 26 were grafted with scions from sweet potato infected with internal cork disease, though symptomless. Thirteen of these plants developed the chlorotic leaf spots, a subsequent experiment confirming this reinfection, while the other 13 and the control plants remained free from spots. The exact relation between this leaf spotting and internal cork root disease of sweet potato is still uncertain.

Lockard (R. G.). **Foliar symptoms of deficiencies of the major elements in Rice.**—*News Lett. int. Rice Comm.* 17, pp. 18–22, 1956.

Studies were made in 1954 by the Department of Agriculture, Federation of Malaya, on the foliar symptoms of nitrogen, phosphorus, potassium, calcium, and magnesium deficiencies of rice [cf. 26, p. 562], which are described. The variety used was Siam 29.

With nitrogen deficiency the necrotic portions of the leaves were light yellow and papery and in severe cases the leaves were narrow. With phosphorus deficiency, yellowing of the leaf tip, with a little reddening, was followed by necrosis down the edges, which became rolled. Symptoms of potash deficiency resemble those of phosphorous, but in severe cases the leaves take on an olive green colour. Calcium deficiency is similar, with marked interveinal chlorosis, and magnesium deficiency much the same, but the colours in general were lighter.

Baba (I.), Takahashi (Y.), Iwata (I.), & Tajima (K.). **Studies on the nutrition of the Rice plant with reference to the occurrence of the so-called 'akagare' disease. III. Varietal differences of the Rice plant in nitrogen and carbohydrate metabolism and inorganic nutrition in relation to the occurrence of the disease.**—*Proc. Crop Sci. Soc. Japan*, 25, 1, pp. 13–14, 1956. [Japanese, with English summary.]

Pot experiments in 1954 and 1955 at the National Institute of Agricultural Sciences, Japan, showed that varietal susceptibility of rice plants to 'akagare' disease associated with potassium deficiency [33, p. 687] was positively correlated with the ratios of soluble nitrogen to starch or to protein nitrogen × starch. The

respiratory rate of leaves showed high positive correlation with starch content. It is concluded that susceptibility is closely related to the amount of respiratory substrate.

NAGATA (Y.) & HAYASHI (K.). **Biochemical studies on Corticium centrifugum. Part I. On the organic acid metabolism.**—*J. agric. chem. Soc. Japan*, 30, 2, pp. 86–89, 1956. [Japanese, with English summary.]

At the Faculty of Agriculture, University of Gifu, Japan, oxalic acid was shown by means of both melting point and paper chromatography to be the sole organic acid produced by [the rice pathogen], *Corticium centrifugum* [cf. 32, p. 326]. The output reached a peak after one week's incubation, after which decomposition by autolysis set in. Thiamine was the growth-promoting substance for *C. centrifugum*, although the relationship between added thiamine and accumulated oxalic acid was not proportional. The optimum initial pH for oxalic acid production was neutral or slightly acid and the most favourable sugar (sucrose) concentration 5 per cent. Peptone was a more suitable source of nitrogen than potassium nitrate, ammonium phosphate, or ammonium sulphate, in decreasing order of efficiency. The growth of the fungus was totally inhibited by 10^{-3} M sodium azide, while the addition of 10^{-3} M mono-iodo acetate resulted in a substantial increase of oxalic acid in the medium.

ATKINS (J. G.). **An outbreak of Piricularia on Rice in 1955.**—*Plant Dis. Reptr*, 40, 5, pp. 372–373, 1956.

A report of the outbreaks of *Piricularia oryzae* on young rice sown in June in the Gulf Coast area, Louisiana, has already been noticed [36, p. 123]. At the Rice-Pasture Experiment Station, Beaumont, Texas, the variety CI 8970 was more susceptible than selection B 4512 Al-32 of C.I. 9122 and infection was increased by nitrogen fertilization.

Secondary leaf fall.—*R.R.I. Plant. Bull.*, N.S., 27, pp. 105–109, 4 figs., 1956.

This is a general account of secondary leaf fall of *Hevea* rubber with particular reference to Malaya, where the condition is associated with *Oidium heveae* [36, p. 124], the dominant pathogen, and *Gloeosporium albo-rubrum* [33, p. 256; 34, p. 397], as well as certain insect species. Clonal differences at wintering give an impression of differences in susceptibility, a clone that winters early refoliating before the sources of infection are abundant. Real differences in susceptibility between clones in Malaya have not yet been established, though the condition is, perhaps, too mild for resistance to be apparent. Control measures are unnecessary.

THORNTON (H. G.). **The development and present problems of soil microbiology.**—*J. Sci. Fd Agric., 1956*, 2, pp. 93–101, 1956.

In this review, accompanied by 104 references, the author deals with the development of soil microbiology, the components and localized distribution of the soil micro-population, the effects of micro-organisms on soil structure and plant nutrients, antagonism between micro-organisms in the soil in relation to root disease, and the problems involved in altering the soil population.

STÖCKLI (A.). **Über den Anteil der Bodenpilze an der organischen Substanz des Bodens.** [On the proportion of soil fungi in the organic matter of the soil.]—*Mitt. schweiz. Landw.*, 4, 8, pp. 125–130, 1956.

Using the technique of Jones and Mollison [27, p. 449; cf. 33, p. 179], the authors determined the microbiological populations of the main Swiss soil types, the samples being collected from a depth of 5 to 10 cm. Whether reckoned by mycelial

length (in metres per gm. dry soil) or by hyphal volume (in cu. mm.), the latter yielding the more credible results, [unspecified] fungi predominated in forest soils (942 m. or 2·9 cu. mm.) and were fewest (359 or 1·11) in alpine pastures. In the humus fraction of the soil the corresponding figures were 10,860 and 5,422 m. Of particular interest were the measurements of the mycelial surface, whereby contact is effected between the organism and its environment. Here again the highest level of 59 sq. cm. was reached in the forest soils and the lowest of 22·5 in the alpine pastures.

Krzemieniewska (Mme H.) & Badura (L.). **Z badań nad mikoflorą lasu Bukowego.** [Some observations on the mycoflora of Beech wood.]—*Acta Soc. Bot. Polon.*, 23, 3, pp. 545–587, 2 graphs, 1954. [English summary.]

During 1951 and 1952, 120 species of fungi (which are listed) were isolated from the forest litter and soil of a beech wood (non-calcareous soil) sloping down to the valley of a stream in Poland [see preceding, and next abstracts], and 102 from the valley (with a high calcium carbonate content); 81 were common to both. The greatest number of fungi was isolated in October and November and the least in March, 16 per cent. being of equal frequency all year round. Mucoraceae were at their maximum in the autumn and species of *Aspergillus* in August.

An analysis of the litter in August showed that all constituents contained the same amount of humic acids and related substances. The soil fungi were successfully cultured on silica gel saturated with mineral salts plus gallotannin, gallic acid, or pyrogallol, the last mentioned giving the weakest growth. *Aspergillus niger* and species of *Penicillium* readily developed on this medium inoculated with humus soil.

Rehm (H.-J.). **Untersuchungen über die Bodenmikroflora von Gatersleben und Umgebung. 4. Untersuchungen über Alternaria tenuis Nees.** [Investigations of the soil microflora of Gatersleben and district. 4. Investigations on *Alternaria tenuis* Nees.]—*Kulturpflanze* (*Ber. Inst. Kulturpfl.-Forsch.*), 4, pp. 222–227, 1956.

In earlier work at Gatersleben [33, p. 446] *Alternaria tenuis* was rarely isolated from the soil. In the present study 22 isolates from soil and (predominantly) from leaf spots on various plants were examined for substances toxic to tomato cuttings and shoots of *Antirrhinum majus* and cereals, antibiotic action on *Bacillus mycoides*, and pathogenicity to tomato. They were assigned to five morphologically identical groups: (*a*) producing toxins active against all the test plants and pathogenic to tomato, but without antibiotic activity; (*b*) similar, but with antibiotic action; (*c*) (one isolate only) non-toxic and non-pathogenic but producing an antibiotic; (*d*) completely inactive; and (*e*) weakly toxic but non-pathogenic. The isolate from tomato produced a toxin active against its own host but one from *A. majus* was completely non-toxic.

On leaf spots *Alternaria tenuis* was often associated with *Cladosporium* and *Stemphylium* spp., particularly *C. herbarum* and *S. botryosum* [*Pleospora herbarum*].

Boosalis (M.). **Effect of soil temperature and green-manure amendment of unsterilized soil on parasitism of Rhizoctonia solani by Penicillium vermiculatum and Trichoderma sp.**—*Phytopathology*, 46, 9, pp. 473–478, 1 fig., 1956.

Added to unsterilized field soil at the Nebraska Agricultural Experiment Station, Lincoln, an isolate of *Rhizoctonia* [*Corticium*] *solani* from soy-bean, which was also pathogenic to peas, was parasitized by *Trichoderma* sp. [cf. 12, p. 192] and *Penicillium vermiculatum*. Some 60 per cent. of the invaded hyphae of *C. solani* yielded the former species and about 20 per cent. the latter. At a soil temperature of 28° C. the same two fungi together attacked approximately 18 and 8 per cent. of the

hyphae of *C. solani* in unsterilized soils amended with green manure (2 per cent. on a dry-weight basis) and untreated, respectively. In both series of tests not more than 40 per cent. of the unparasitized hyphae remained viable after a period of eight weeks in the soil. At a soil temperature of 18° *C. solani* was not attacked to any extent by soil-inhabiting fungi, and some 60 per cent. of its unparasitized hyphae retained their viability in both the manured and unamended plots.

C. solani was appreciably more susceptible to *P. vermiculatum* when grown on a potato dextrose agar medium containing 20 gm. dextrose per l. than on one with only 10 gm. None of the 30 cultures of *C. solani* tested was highly resistant to *P. vermiculatum*, though some withstood invasion more successfully than others. Among the very susceptible isolates was one reported to be itself a parasite of a number of fungi [30, p. 422].

P. vermiculatum established internal parasitic mycelium in hyphae of *C. solani* by means of penetration pegs arising either from hyphae in contact with the host mycelium or from mycelium coiling round the host hyphae. Hyphal branching of *P. vermiculatum* occurred regularly at the junction of branches of the host hyphae.

Partial control of the damping-off and seedling blight of peas caused by *C. solani* was effected by simultaneous inoculation of sterilized soy-bean field soil with the pathogen and *P. vermiculatum*, but the results of comparable tests in unsterilized plots were much less satisfactory, some 60 per cent. of the plants succumbing to damping-off and nearly half the survivors developing seedling blight.

The hot-water method (abs. in *Phytopathology*, 44, p. 482, 1954), essentially a modification of Warcup's partial steam sterilization technique [31, p. 297], involving 1½ minutes' submersion of infested soil in water heated to 75°, proved effective for the isolation of *P. vermiculatum* and other species of *Penicillium* and *Streptomyces*.

Overman (A. J.) & Burgis (D. S.). **Allyl alcohol as a soil fungicide.**—*Phytopathology*, 46, 10, pp. 532–535, 1 fig., 1956.

Investigations at the Gulf Coast Experiment Station, Bradenton, Florida, showed that application to sandy soils of allyl alcohol, 1 in 200, at 25 gals. per acre (in preference to 12 or 50), originally used as a herbicide, was also highly beneficial in controlling [unspecified] damping-off in vegetable seed-beds [cf. 35, p. 510]. This result is attributed principally to an increase in the population of *Trichoderma* spp., antagonistic to damping-off fungi, which is brought about by the treatment [cf. 35, p. 231]. Results over five seasons on tomato seed-beds have shown that the effect lasts for eight weeks after application (compared with methyl bromide, for instance, the effect of which is transitory), and planting may be done within 24 hours without ill effect. Nitrifying bacteria were inhibited for three weeks, but actinomycetes were unaffected.

Strecker (B.). **Untersuchungen über die Einwirkung von organischen Fungiziden auf Bodenpilze.** [Studies on the action of organic fungicides on soil fungi.]—*Z. PflKrankh.*, 64, 1, pp. 9–35, 8 figs., 4 graphs, 1957. [English summary.]

A detailed account is given of the methods and results of experiments performed recently at the Institute for Plant Pathology and Plant Protection, Georg-August University, Göttingen, Germany, to determine the action of the dithiocarbamates [cf. 33, p. 308; 35, p. 911] ferbam, ziram, thiram, nabam, and zineb; of the trichlorodi-, trichlorotri-, and pentachloro-nitrobenzenes, tritisan (15 per cent. PCNB [33, p. 530 *et passim*]), and rhodanedinitrobenzene; and of malachite green, quinosol, and ceresan on 11 species of parasitic and saprophytic soil fungi, including *Rhizoctonia* [*Corticium*] *solani* [36, p. 59], *Alternaria tenuis* from tomato, and *Fusarium avenaceum*, *F. culmorum*, and *F. solani* from peas.

The phenomenon described as 'inversion of toxicity' [22, p. 364] was observed

in most of the tests involving the lower dialkyl-dithiocarbamates. Pentachloronitrobenzene occupies a unique position among the fungicides tested. Used in the form of vapour [cf. 31, p. 428], its fungistatic effects on spores on nutrient agar are non-specific whereas on mycelium they are selective.

The spectra of influence of the fungicides proved to be strongly dependent on their structure, thereby affording clues to the mechanism of action. The sensitivity of three of the fungi tested—*A. tenuis*, *Aspergillus niger*, and *F. solani*—to thiram, nabam, and the trichlorodi-, trichlorotri-, and rhodanedi-nitrobenzenes fell to a minimum at their optimum growth temperatures. The results of tests on *Trichoderma viride*, *A. niger*, *Alternaria tenuis*, and *F. solani* revealed disparities in the effects of thiram, nabam, trichlorotrinitrobenzene, and rhodanedinitrobenzene on the mycelium and spores [cf. 34, p. 383]. Another factor contributing to the differential action of the compounds was the nutritional status of a given fungus. Thus, the growth of a practically nutrient-free mycelial suspension of *C. solani* was inhibited by malachite green at a concentration of 0·5 p.p.m., whereas its development on nutrient agar disks was not entirely suppressed by the same fungicide even at a strength of 13·6 p.p.m.

Ceresan, thiram, nabam, and trichloronitrobenzene were shown to disturb the balance in the antibiotic equilibrium between *Cephalosporium* sp. and *F. solani*, *F. culmorum*, *F. avenaceum*, and *A. niger*, the effect in a given instance being dependent on the concentration of the fungicide.

Wiebe (H.). **The most serious nutritional disease of horticultural crops in Utah : chlorosis.**—*Fm Home Sci.*, 17, 1, pp. 6–7, 16, 2 figs., 1956.

At the Agricultural Experiment Station, Logan, Utah, bean plants grown in nutrient solutions containing large amounts of sodium bicarbonate developed iron chlorosis while those in solutions with excess calcium chloride and sodium chloride were normal. Radioactive iron, when added to the solutions, was found after two days in leaves of all plants except those in the sodium bicarbonate solution.

It is concluded that bicarbonate is the main cause of iron chlorosis of fruit crops and ornamentals on Utah soils, where calcium and sodium bicarbonates are the most common soluble salts.

Magnitsky (K. P.). Признаки магниевого голодания растений. [Symptoms of magnesium deficiency in plants.]—Наука перед. Опыт сел. Хоз. [*Sci. advanced Exp. Agric.*], *1956*, 9, pp. 17–18, 4 col. pl., 1956.

Descriptions are given of the symptoms produced by magnesium deficiency in a number of crops, including cereals, fodders, tobacco, sunflower, cotton, and vegetables, in the U.S.S.R. Applications of dolomite meal (1 to 3 tons per ha. ploughed under before sowing), burnt dolomite (ploughed under, on the surface, or for fodder crops included in the fertilizer at 2 to 4 centners [1 centner = 50 kg.] per ha.), and dunite (containing magnesium silicate, ploughed under on acid soils at 2 to 4 tons per ha. or otherwise applied at 5 to 10 centners per ha.) assured sufficient magnesium for a prolonged period.

Cartledge (E. Gwenda). **An investigation into the diseases of Tasmanian Hops.**—*Tasm. J. Agric.*, 27, 3, pp. 210–219, 4 figs., 1956.

The author describes the principal hop diseases observed in Tasmania from 1950 to 1956. *Verticillium* wilt (*V. dahliae*) [cf. 35, p. 927] causes widespread loss. 'Blackbutt', associated with *Fusarium* spp. [cf. 33, p. 260], appears each year; as the symptoms were not reproduced by inoculation the fungi may affect only injured or unthrifty plants. Nettlehead virus [cf. 35, p. 326], known to local growers as 'take-all', is common, while mosaic virus [29, p. 176], though less so, has been

increasing. Crown gall (*Agrobacterium tumefaciens*) [cf. 28, p. 592] is widespread but causes little damage, incidence being highest on California Golden Cluster.

Watson (Joyce) & Askew (H. O.). **Molybdenum deficiency in Hops.**—*Nature, Lond.*, 178, 4545, pp. 1302–1303, 1 fig., 1956.

Most of the information contained in this paper has already been noticed [35, p. 282]. The results of sodium molybdate treatment [loc. cit.] were equally successful in New Zealand in the 1955–6 season. The severe symptoms shown by many untreated hops did not generally extend above 5 ft. from the ground so that most of the leaves appeared healthy. The molybdenum content of the cones was greater than that of the laminae in both healthy and deficient plants.

Schuster (M. L.). **Investigations on the foot and root phase of Safflower rust.**—*Phytopathology*, 46, 11, pp. 591–595, 1 fig., 1956.

Investigations of safflower rust (*Puccinia carthami* [35, p. 488] at the University of Nebraska, Lincoln, showed that soil temperatures of 15° to 25° C. favoured infection [34, p. 321], but at 30° to 35° none took place. This was reflected in the escape from rust of most late planted safflower. Variation of soil moisture levels from 35 to 80 per cent. water-holding capacity did not affect the degree of infection. Under field conditions teleutospores survived for 12 months but not for 21. Infected safflower straw stored at 5° contained some viable teleutospores after 45 months. Seed dressings in general did not afford protection against soil infection, though actidione at 250 or 1,000 p.p.m. gave control but decreased emergence. There were indications that varietal reaction of safflower to the rust may vary according as to whether uredospores or teleutospores are the source of infection.

Sugar Cane diseases and their world distribution. The I.S.S.C.T. Standing Committee on Sugarcane diseases.—*Sug. Cane News*, 32, 8, pp. 410–418; 9, pp. 510–514, 1956.

This paper, reprinted from *Proc. int. Soc. Sug. Cane Tech., 1956*, is introduced by a recapitulation of the terms of the resolution adopted by the Section on Cane Diseases of the 1950 Congress of the Society, and comprises two parts, (I) a check list of the sugar-cane diseases of the world, the cause of each disease and the countries in which it occurs; and (II) the cane sugar producing countries of the world and the diseases occurring in each country [cf. 31, p. 298].

Collateral hosts of red rot.—*News Lett. Indian Inst. Sug. Cane Res.*, 2, 5, 2 pp., 1956.

The following were shown to be hosts of the fungus causing red rot of sugar-cane [*Glomerella tucumanensis*: 35, p. 329] in inoculation experiments at Bihar, India, in 1950–2: *Saccharum spontaneum*, *S. robustum*, *Narenga* sp., *S. fusca*, sorghum, *Sorghum halepense*, *Erianthus munja*, and (less severely infected) maize. During 1954 infection was found on *S. halepense*, *Saccharum spontaneum*, and *E. munja* at the Indian Institute of Sugarcane Research, Lucknow.

Albuquerque (M. J.) & Arakeri (H. R.). **Red sheath disease of Sugarcane in Bombay State.**—*Indian Sug.*, 6, 7, pp. 451–452, 1 fig., 1956.

Information is presented in popular terms on the symptoms, life-history, and control of red sheath disease (*Sclerotium rolfsii*) of sugar-cane, which is reported to be widespread and destructive in Bombay State, where it attacks the leading variety Co. 419 and several other promising lines, e.g., 678, 718, 740, and 798. In addition to rational cultural methods, seed treatment with a standard mercurial [35, p. 720] is recommended.

Gummosis outbreak : whole of Sugar Belt to be surveyed.—*S. Afr. Sug. J.*, 40, 11, p. 865, 1956.

In consequence of the apparent spread of gumming disease [*Xanthomonas vasculorum*] to sugar-cane plantings remote from the original focus of infection in Natal [36, p. 62], a rapid survey of the entire sugar belt is to be undertaken by five inspectors from the Division of Plant Control and Quarantine, Stellenbosch. C. W. Edgerton's description of the disease is recapitulated [36, p. 2].

Del Prado [F. A.] & Van Suchtelen [N. J.]. **Lijst van ziekten van land- en tuinbouwgewassen in Suriname.** [List of diseases of agricultural and horticultural crops in Surinam.]—25 pp., 1955. [Mimeographed. Received 1956.]

This list, produced by the Surinam Department of Agriculture, sets out the diseases of economic plants in Surinam under their respective hosts, giving (in three columns) the common names of the diseases, Latin names of the parasites, and a short description of symptoms. The occurrence of many of these diseases has been noticed in this *Review* from time to time. Included are *Dothidella ulei* on *Hevea* rubber (map 27) and *Puccinia polysora* on maize (map 237).

Copeland (H. F.). **The classification of lower organisms.**—ix+302 pp., 3 pl., 43 figs., Palo Alto, California, Pacific Books, 1956. $7.50.

Following an introductory chapter and a second on nomenclature, the remaining ten chapters of this book are devoted to the author's novel classification of all the organisms which he considers should not be included in the plant and animal kingdoms. They are disposed in two kingdoms: the Mychota, organisms without nuclei, including the Schizophyta (bacteria and actinomycetes); and the Protoctista, for all the red and brown algae (and Vaucheriaceae), the fungi, and the protozoa. The Saprolegniales, Peronosporales, and Lagenidiales are classified with the Phaeophyta (brown algae), the Monoblepharidales and Chytridiales in a separate phylum (Opisthokonta), and the remaining fungi as classes of the phylum Inophyta. The name of 'Fungi' is kept for the Hymenomycetes. The Myxomycetes form the second class (Mycetozoa) of the phylum Protoplasta (Protozoa).

Each group (down to orders) is annotated, with synonymy and keys to the sub groups. Brief resumés of the families are given with indications of the principal genera.

The work concludes with a bibliography of 32 pages.

Johnson (T. W.). **The genus Achlya : morphology and taxonomy.**—xv+180 pp., 22 pl., Michigan, The University Press; London, Oxford University Press, 1956. 36*s*.

This work forms volume XX of the Scientific Series of the University of Michigan Studies and is devoted entirely to the one genus. A 19-page introduction covers the history, occurrence, collection, isolation, culture, and preservation of species of *Achlya*, and taxonomic criteria and terminology. The remainder of the book covers the 37 spp. considered to be legitimately included in the genus [3, p. 3], nine taxa of doubtful affinities, and 18 excluded taxa. There are keys to the three subgenera recognized and to the species, full descriptions of the species with synonymy, lists of the material examined, and finally a 13-page bibliography.

Arnaud (G.). **Mycologie concrète. III. La structure des Pyrénomycètes.** [Concrete mycology. III. The structure of the Pyrenomycetes.]—*Bull. Soc. mycol. Fr.*, 72, 2, pp. 97–121, 9 figs., 1956.

In this contribution to the present series [cf. 34, p. 614] the author expresses the view that in the present state of knowledge it is not possible to make a definitive classification of the Pyrenomycetes; provisionally, the best course is to adopt the

broad, general classification of Saccardo (*Syll. fung.* 1, 1882) with the addition of the Erysiphales *sensu stricto* and the reservation of the Perisporaceae. Based as it is on rather vague characters and on the general trend of the genera rather than on precise characters, the proposed grouping offers a better likelihood of establishing a natural classification, which is greatly to be preferred to the very artificial systems proposed in recent years [cf. 11, p. 606].

The features considered by the author in detail are the browning or reddening of the cellular perithecial wall, the primary and secondary stromata, the ostiole, the central tissue of the perithecium, and the ascogenous tissue (number, reduction, and increase of asci).

The author regrets the rigidity of the law of priority, which he considers to be one of the major obstacles to progress in mycology.

Ciferri (R.) & Batista (A. C.). **An intermediate genus between Parodiopsidaceae and Meliolaceae.**—*Publ. Inst. Mycol., Recife*, 36, 8 pp., 7 pl., 1956.

A sooty mould forming delimitate colonies on living leaves of sour orange at Recife, Brazil, is designated *Paropodia intermedia* n.gen., n.sp. A similar fungus on sweet lime, but with mycelial setae, as well as the perithecial ones found on *P. intermedia*, is named var. *setosa* n.var.

Moravec (Z.). **Arachnocrea, un genre nouveau de la famille Nectriaceae.** [*Arachnocrea*, a new genus of the family Nectriaceae.]—*Bull. Soc. mycol. Fr.*, 72, 2, pp. 160–166, 2 figs., 1956.

The author considers that the genus *Protocrea* Petch should be confined to species with sub-globose spores; to accommodate a species studied by him and characterized by fusiform spores with triangular cells he erects a new genus, *Arachnocrea*. Descriptions are given of the type species, *A. stipata* (syn. *Hypocrea stipata* Fuck.) n.comb. and of *A. citrinella* (*H. citrinella* Ellis) n.comb.; a key for the determination of genera of the Nectriaceae with 2-celled spores is provided.

Săvulescu (T.). **Contribution à l'Ustilaginoflore de la République Populaire Roumaine.** [A contribution to the smut flora of the Romanian People's Republic.]—*Rev. Biol., Bucharest*, 2, pp. 5–13, 7 figs., 1954. [Received 1956.]

In further studies on the Ustilaginales of Romania [cf. 35, p. 490] the author describes the type material of *Ustilago fussii* (*Verh. naturf. Ver. Brünn*, 10, pp. 156–157, 1872), collected on the leaves of *Juniperus nana* in the Csiker Alps, Hargitta, Romania.

Shepherd (Audrey M.). **A short survey of Danish nematophagous fungi.**—*Friesia*, 5, 3–5, pp. 396–408, 6 figs., 1956.

Included among the 19 species of nematode-destroying fungi described in this paper, all collected in Denmark from 1952 to 1954, are *Harposporium crassum* [35, p. 93] and *Haptoglossa heterospora* [19, p. 593] (a new record for Europe); the remainder, except *Arthrobotrys oligospora* [34, p. 781], are almost certainly first records for Denmark; they are *Acrostalagmus obovatus* [21, p. 15], *Harposporium anguillulae* [18, p. 107], *H. lilliputanum* (*Trans. Brit. mycol. Soc.*, 35, p. 146, 1952), *Nematoctonus tylosporus* [21, p. 15], *Arthrobotrys conoides* [17, p. 36], *A. cladodes* var. *macroides* [23, p. 299], *A. dactyloides* [17, p. 36], *A. musiformis* [loc. cit.], *A. robusta* [31, p. 283], *Dactylella cionopaga* [29, p. 304], *D. doidycoides* [19, p. 703], *D. ellipsospora* [17, p. 36], *Dactylaria brochopaga* [loc. cit.], *D. thaumasia* [loc. cit.] var. *longa* Dixon var. nov. ined., and *Stylopage hadra* [14, p. 508].

A. oligospora was outstanding in frequency of appearance in widely separated localities under very different environmental conditions and is thought to be most probably endemic in Danish soils.

Menon (R.). **Studies on Venturiaceae on rosaceous plants.**—*Phytopath. Z.*, 27, 2, pp. 117–146, 9 figs., 1956. [German summary.]

This important contribution from the Swiss Federal Institute of Technology, Zürich, to the knowledge of the species of *Venturia*, *Coleroa*, and *Gibbera* parasitic on Rosaceae [35, p. 290] describes comparative morphological and cultural studies, supplemented by inoculation experiments with *V. inaequalis* on apple, *V. pirina* on pear, and *V. pruni-cerasi* on cherry. These three species and *V. palustris* from *Comarum palustre* formed mature perithecia in pure culture. The author rejects *V. cerasi* (1900) which is antedated by *V. pruni-cerasi* (1878).

As a result of cross-inoculation tests with *V. inaequalis* the author was able to recognize a number of morphologically indistinguishable biotypes which are described as formae speciales, viz., *mali* n.f.sp. on apple, *aucupariae* (syn. *Sphaerella aucupariae* Lasch) n.comb. on *Sorbus* spp., *crataegi* (syn. *V. crataegi* Aderh.) n.comb. on *Crataegus oxyacantha*, and *cotoneasteris* n.f. sp. on *Cotoneaster integerrima*.

Two new species are described, *V. tomentosae* on *C. tomentosa* in Ticino, Switzerland, and *V. mulleri* on *Rosa pendulina* in Grisons, Switzerland, and Névache, France. Other species dealt with are *V. potentillae* on *Potentilla anserina* (herbarium specimens), *V. alchemillae* on *Alchemilla glaberrima* and *A.* sp. in France and Switzerland, *Coleroa chaetomium* on overwintered raspberry leaves in the Alpes Maritimes, France, and in Switzerland, and *Gibbera rosae* (syn. *V. rosae*) [36, p. 214] on *R. pendulina*.

Specimens of *Fusicladium* [*dendriticum* var.] *eriobotryae* on loquat [25, p. 493; 26, p. 533] were received from Ticino, but all attempts to grow the fungus in pure culture were unsuccessful.

Engelhard (A. W.) & Carter (J. C.). **Isolations of Verticillium albo-atrum from woody hosts in Illinois, 1945–1955.**—*Plant Dis. Reptr*, 40, 5, pp. 459–462, 2 figs., 1956.

During the period from 1945 to 1955 the following hosts of *Verticillium albo-atrum* were recorded in Illinois [cf. 18, p. 67] (*Plant Dis. Reptr*, 29, pp. 95–96, 1945): *Magnolia* sp., black gum (*Nyssa sylvatica*), multiflora rose, Augustine ascending elm (a form of *Ulmus americana*), Chinese elm (*U. parvifolia*), and tulip tree (*Liriodendron tulipifera*), all apparently new to the literature, *Koelreuteria paniculata* [cf. 15, p. 474], a new record for the United States, and English elm (*U. procera*) and slippery elm (*U. rubra*), not before recorded in Illinois.

Bernaux (P.). **Contribution à l'étude de la biologie des Gymnosporangium.** [A contribution to the study of the biology of *Gymnosporangium*.]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 7, 1, pp. 1–210, 77 figs., 3 diags., 15 graphs, 7 maps, 1956.

In this detailed study of *Gymnosporangium* the author presents a full account of his work from 1943 to 1953 at the Laboratory of Botany and Plant Pathology, National School of Agriculture, Montpellier, France. The original aim was to investigate the life-cycle of *G. fuscum* (now the valid name for the species previously called *G. sabinae* [cf. 34, p. 20]), which is abundant on wild and cultivated pear trees near Montpellier, though the usual host, *Juniperus sabina*, is not found. A detailed survey was also carried out on all the other species of *Juniperus* that occur locally and all the wild and cultivated species of Rosaceae growing near them for *Gymnosporangium* spp. A phenological study was made of the host relations together with the anatomy of the development of the leaves in the Rosaceae, which in turn enabled the author to determine the conditions of leaf penetration and the state of resistance of the leaf. Finally, the effect of meteorological conditions on the biology and ecology of the fungi was investigated.

There are three main parts: the first (pp. 5–41) covers the history, generic limits, life-cycles, and geographical distribution; the species found in the Mediterranean area in relation to their environmental conditions, including mycological studies carried out locally since 1863; and methods and techniques used. In the second part (pp. 43–181) each of the five sections is devoted to a single species. *G. gracile*, found in abundance in the neighbourhood of Montpellier on *Juniperus oxycedrus* and its var. *macrocarpa*, *Cydonia* spp., and *Crataegus* spp., has coloured teleutospores 58 by 15 μ and colourless ones 72 to 86 (90) by 11·2 to 15 μ, the former with the upper cell small and spherical (22 to 25 μ) and the latter with two equal cells; the spermogonia are 160 to 200 by 90 μ and the deep brown aecidiospores 25 to 28 μ with four or five pores. *G. clavariiforme*, on the other hand, is found rarely and only on *J. communis* in the teleuto stage near Montpellier. The sori are larger and the brooms fewer. The coloured teleutospores are 76 to 86 by 13 to 17 μ, with the spherical upper cell shorter by 10 μ than the lower; the colourless spores are 80 to 105 by 13 to 15 μ, the spermogonia 130 to 150 by 110 to 120 μ, and the aecidiospores clear brown, 25 to 27 μ, with six to eight pores.

G. confusum, found on *J. oxycedrus* and *J. phoenicea*, *Crataegus monogyna*, *C. ruscinonensis*, and quince, is considered to be nearer *G. gracile* than is *G. clavariiforme*. *G. fuscum* parasitizes *J. oxycedrus*, *J. phoenicea*, and *Pyrus* spp. *G. tremelloides*, found on *J. communis*, *J. nana*, *Sorbus*, *Amelanchier*, and *Malus* spp., is rare in the Mediterranean area of France.

The information on each species covers the history, geographical distribution, synonymy, and life-cycle, followed by morphological and biological studies of the diploid and haploid phases under the headings: morphology of the parasite; morphology of the host; morphology, anatomy, and physiological consequences of the host-parasite complex; general conditions in which the parasite develops; development of the host; and influence of natural factors on the development of the fungus.

The third part (pp. 183–210) comprises general comparisons between the species, with keys for their determination, general conclusions, and a bibliography of 20 pages. The life-cycle of *G. gracile* is one of the most rapid found in the vicinity of Montpellier. *G. fuscum* has a much more prolonged life-cycle than the other species studied. The formation of the teleutospores occurs later in the season and they mature later. The development of the aecidial stage is also longer. Locally, *G. clavariiforme* develops rapidly, the sori appearing late in the season. *G. tremelloides* matures late (at the end of April); rain is necessary, and the species requires more water than the others, because of the mass of the sorus, which would dry up otherwise. In Europe *G. minus* is the only species of the genus with a different conifer host (*Cupressus*), but in the region of Montpellier no rust could be found on this plant.

Both in the teleuto and in the aecidial stages *Gymnosporangium* causes hypertrophy, accompanied by hyperplasia of the non-lignified tissues; the collenchyma particularly is affected. The teleutospores appear and develop during spring and germinate immediately. The coloured teleutospores appear first, during cold weather, and are confined to the surface of the sorus, which they serve to protect. All the species found locally require at least 4 mm. of rain and an atmospheric humidity of over 90 [per cent.] during 15 hours for development. Violent rain carries the sori away. The swelling and drying-up of the teleutospores depends on the rapid alternation of wet and dry weather characteristic of the Mediterranean area of southern France. Low temperatures may retard or prevent the germination of the teleutospores.

G. gracile, found also in north Africa and Corsica, always appears first on the side of the witches' broom exposed to the sun, while *G. confusum*, widespread in northern Europe, develops on the unexposed side. The most favourable times for infection

are when the thin cuticle is still incompletely formed; susceptible sites occur at those points where the leaf is growing (sinuses, dentations, etc.).

The information obtained on the life-cycles of the different species and on the dates at which Rosaceae may become infected, in relation to meteorological factors, now makes the possibility of control on cultivated trees by fungicidal treatment more likely. Earlier attempts at control by removal of wild junipers were effective only if they had been in close proximity to the cultivated trees on which control was desired. In any case, wild junipers are so numerous locally that they cannot all be removed.

O'Konski (C. T.) & Applequist (J. B.). **Polymerization of Tobacco mosaic virus from electric birefringence studies.**—*Nature, Lond.*, 178, 4548, pp. 1464–1465, 1956.

At the Department of Chemistry and Chemical Engineering, University of California, Berkeley, tobacco mosaic virus strain I, which was shown to have no detectable end-to-end polymers, was polymerized in the presence of methylene blue (R. S. Welsh, *J. gen. Physiol.*, 39, p. 437, 1953) and measured by oscillographic recording of the birefringence transients produced by rectangular pulses. The hypothesis that a mixture of monomer and end-to-end dimer was produced was borne out by experimental results. The degree of polymerization increased with the concentration of methylene blue and was reversible to some extent.

The results illustrate a method for studying the interactions of biological macromolecules and small ions to determine the location of interacting groups on the macromolecule.

Hirth (L.), Galzy (Rose), & Slisewicz (P.). **Influence de quelques facteurs sur la multiplication du virus de la mosaïque du Tabac dans les disques de feuilles immergés.** [Influence of some factors on the multiplication of Tobacco mosaic virus in immersed leaf disks.]—*C. R. Acad. Sci., Paris*, 244, 2, pp. 258–261, 1957.

In further studies in the current series [36, p. 137] coco-nut milk at concentrations of 5 to 15 per cent. exerted a differential action on the multiplication of tobacco mosaic virus in floating disks of inoculated White Burley tobacco leaves in liquid media (water or Knop's solution at half strength) in Petri dishes according to the prevailing conditions. For instance, in the absence of carbohydrates it promoted multiplication but with added glucose (20 gm. per l.) the process was inhibited in light; inhibition also occurred in darkness except in media supplemented by indole-acetic acid at a concentration of 10^{-6}, when the influence of coco-nut milk was stimulatory. Thus, the growth substance demonstrates the probable existence in coco-nut milk of two fractions, one with properties favouring the multiplication of tobacco mosaic virus and operating only in darkness and in the presence of indole-acetic acid, and the other acting in the opposite direction principally in the absence of the auxin.

Light plays an important part in virus multiplication, not only in its capacity as one of the fundamental elements in the photosynthetic process but also because it modifies the content and distribution of indole-acetic acid in the plant tissues.

The effect of coco-nut milk on tobacco mosaic virus is most pronounced in the presence of mineral salts.

Reddi (K. K.) & Knight (C. A.). **Structural studies on the nucleic acids of some strains of Tobacco mosaic virus. I. The residual material after ribonuclease digestion.**—*J. biol. Chem.*, 221, 2, pp. 629–633, 1956.

At the Virus Laboratory, University of California, Berkeley, the nucleic acids obtained from five strains of tobacco mosaic virus [36, p. 132] were digested with ribonuclease at 23° C. for 36 hours at pH 7·6 and the resistant residues, precipitable

by 6 per cent. trichloroacetic acid, analysed for their contents of purine and pyrimidine bases. The composition of the residues of all five strains appeared to be identical, i.e., they were rich in purine, poor in pyrimidine, and averaged about six nucleotides.

Cartwright (T. E.), Ritchie (A. E.), & Lauffer (M. A.). **The reaction of Tobacco mosaic virus with formaldehyde. III. Kinetics of the loss of infectivity.**—*Virology*, 2, 5, pp. 689–702, 2 graphs, 1956.

Studies at the Department of Biophysics, University of Pittsburgh, Pennsylvania, indicated that the beta hydroxy groups of serine and threonine, the hydroxy group of ribose, and the amino group on the pyrimidine and purine rings in the nucleic acid are probably those involved in the formaldehyde inactivation of tobacco mosaic virus [cf. 32, p. 61; 33, p. 120]. The specific reaction rate constant for inactivation of the virus depended on the concentration of formaldehyde when 2 per cent. virus solutions were allowed to react with 1, 2, 4, and 7 per cent. formaldehyde solutions at pH 6·6 and 30° [C.]. These results appeared to indicate that inactivation was induced by the reaction of a single formaldehyde molecule at one site on the virus characteristic particle. Changes in pH did not appreciably affect the value of the rate constant between pH 4·1 and pH 8·4. A bibliography of 34 titles is appended.

Noordam (D.). **Waardplanten en toetsplanten van het ratelvirus van de Tabak.** [Hosts and test plants of the Tobacco rattle virus.]—*Tijdschr. PlZiekt.*, 62, 5, pp. 219–225, 1 fig., 1956. [English summary.]

At the Phytopathological Research Institute, Wageningen, the Netherlands, potato stem mottle virus [35, p. 580] was shown by sap inoculation on White Burley tobacco to be present in the roots of 24 out of 35 plants tested, including *Capsella bursa-pastoris*, *Solanum nigrum*, and *Stellaria media*, which were particularly suitable for the demonstration of infection, while its cultivated hosts included cabbage, turnip, and rye. *Solanum nigrum* was the only species to show definite symptoms in the field and those only in July and August. Growing in pots, some plants of *S. nigrum* developed a mosaic, while the leaves of *Stellaria media* exhibited pale green rings. No symptoms were detected in the roots of any of the plants examined [cf. 36, p. 171].

The inoculation of detached leaves of 31 species gave positive results in 11, including cucumber, which developed yellow ring spots, *Nicotiana rustica*, bean (*Phaseolus vulgaris*), pea, and tomato (all with necrotic spots, sometimes surrounded by a slightly yellow zone). It is thought that these supplementary hosts of the virus may be of great importance in the maintenance and increase of its concentration in field soils.

A new argument in support of the hypothesis that potato spraing [34, p. 67; 35, p. 89] and stem mottle virus are related is provided by the results of these investigations. In the six fields from which the above-mentioned test plants were collected spraing was of regular occurrence in potatoes but the stem mottle virus was never detected in that host though uniformly present in the roots of susceptible weeds. Evidently, therefore, soils may be infested by stem mottle without inducing any symptoms of the virosis in potato.

Wolf (F. A.). **Albinistic variegation of Tobacco leaves, a periclinal chimera.**—*J. Elisha Mitchell sci. Soc.*, 72, 1, pp. 83–87, 1 diag., 1956.

Attention is drawn to the appearance on tobacco leaves of large, irregular, creamy-white to yellowish-green patches, described under a variety of names from different parts of the world. Such symptoms were noted on a plant in North Carolina in 1953. Subsequent cross pollinations between flowers on affected and

normal shoots of this plant and also those of a normal plant showed that the variegation was not hereditary, and it was attributed to a periclinal chimera, arising spontaneously.

Burk (L. G.) & Heggestad (H. E.). **Weather fleck on Nicotiana tabacum.**—*Plant Dis. Reptr*, 40, 5, pp. 424–427, 2 figs., 1956.

Weather fleck, a leaf spot disease due to rains and prolonged high humidity, was severe during 1955 in tobacco plantings at Beltsville, Maryland. The tan-to-brown spots, becoming white with age, are up to 2 mm. in diameter. The dark, fire-cured types of tobacco are less susceptible than the Burley varieties.

Shaw (L.) & Thorne (G. W.). **Wildfire control studies in Burley Tobacco plant beds in North Carolina in 1955.**—*Plant Dis. Reptr*, 40, 4, pp. 325–327, 1956.

At the Mountain Research Station, Waynesville, North Carolina, four applications at weekly intervals, beginning immediately after inoculation, of 200 p.p.m. streptomycin spray (5 gals. per 100 sq. yds.) and of 1,000 and 2,000 p.p.m. streptomycin dust (3 to 4 lb.) and three applications of 200 p.p.m. streptomycin spray (agrimycin 100, 10 gals.), beginning seven days after inoculation, reduced the index of tobacco wildfire (*Pseudomonas tabacum*) [35, p. 795] in the plant bed from 72·3 (untreated) to 17·2, 22·7, 21·7, and 15·4, respectively, a reading of 100 indicating severe disease. There was little difference in control between the 5- and 10-gal. rates of application of streptomycin or between three and four applications (the first immediately after inoculation) of agrimycin 100.

Kramer (M.). **A possibilidade de contrôle das doenças de virus do Tomateiro por inseticida sistêmico.** [The possibility of controlling Tomato virus diseases by systemic insecticides.]—*Biológico*, 22, 10, pp. 177–181, 1 fig., 1956.

Preliminary results of studies at the Instituto Biológico, São Paulo, showed that virus diseases of tomato, particularly spotted wilt [27, p. 203], curly top [strain of beet curly top virus: 29, p. 127], cucumber mosaic, and tobacco mosaic, can be effectively controlled by dusting with the systemic experimental compound 3911 (American Cyanamide Company), but its high toxicity to man and domestic animals precludes its use at present.

Walter (J. M.). **Hereditary resistance to Tobacco-mosaic virus in Tomato.**—*Phytopathology*, 46, 9, pp. 513–516, 1 fig., 1956.

Progress has been made at the Gulf Coast Experiment Station, Bradenton, Florida, in transferring the tobacco mosaic resistance [35, p. 553 *et passim* and next abstract], originating in a three-way cross (Rutgers×*Lycopersicon hirsutum* P.I. 126445 with Indiana Baltimore), to commercially suitable tomato types [cf. 36, p. 139]. A combination of green and yellow strains of the virus, inoculated into tomato seedlings by the method of Richards and Munger [24, p. 265], was used in testing resistance, which is a non-symptomatic tolerance; its effectiveness is lost, however, by the superimposition of other viruses such as tobacco etch [see next abstract] and potato viruses X and Y. The F_2 of resistant-susceptible crosses showed ratios approaching 63 susceptible to 1 resistant, indicating that the parents differ in their reaction to tobacco-mosaic virus by three recessive genes, and that resistance is not as described by other workers [cf. 34, p. 406].

Walter (J. M.). **Combination of resistances to Tobacco-etch and Tobacco-mosaic viruses in Tomato breeding stocks.**—*Phytopathology*, 46, 9, pp. 517–519, 1 fig., 1956.

As resistance to tobacco mosaic virus [see preceding abstract] in tomato is nullified by the additional presence of tobacco etch virus [26, p. 32 and preceding

abstract], combined resistance to both is desirable. The tomato variety Scarlentawen (P.I. 183692) from Turkey though susceptible to other viruses was resistant to etch; crossed with CStMW18, the best available stock resistant to tobacco mosaic, it gave a few selections resistant to both viruses, applied separately or together. Further crosses have been made to add resistance to fungus diseases. Negative results in transmissions to *Capsicum frutescens* [33, p. 402] from F_2 plants of one of the resistant selections inoculated with etch suggest they may be immune from the virus; one recessive gene appears to determine its inheritance.

Bovey (R.). **Une nouvelle maladie à virus de la Tomate en Suisse romande.** [A new virus disease of the Tomato in French-speaking Switzerland.]—*Annu. agric. Suisse*, (70), N.S., 5, 5, pp. 599–611, 5 figs., 1956. [German, English, and Italian summaries.]

A disease of tomatoes which has been observed since 1953 in the vineyard areas of Marcelin-sur-Morges, Changins-sur-Myon, Lausanne, and Clarens, is attributed on the basis of symptomatology on several solanaceous hosts to big bud virus [cf. 35, p. 726], not hitherto reported from Switzerland. It was transmitted by grafting to tomato, tobacco, potato, and *Datura stramonium*. No symptoms developed on greenhouse potato plants, but nearly all the tubers produced by plants inoculated in 1955 had very severe symptoms of spindle sprout [cf. 35, p. 540 *et passim*] in 1956. There must be a carrier of the virus to account for its spread in the field, but experiments with the aphids *Myzus persicae* and *Aulacorthum solani* yielded negative results, as also did attempts at transmission by mechanical methods and the use of dodder (*Cuscuta epithymum*) as a 'bridge'.

Spencer (E. L.), Kelbert (D. G. A.), Kelsheimer (E. G.), & Burgis (D. S.). **Growing Tomatoes on the sandy soils of peninsular Florida.**—*Bull. Fla agric. Exp. Sta.* 563, 32 pp., 7 figs., 1956.

On pp. 19–22 and 25–26 of this bulletin the principal fungus, virus, and physiological diseases of tomatoes on Florida sandy soils [cf. 35, p. 512] are discussed and control measures recommended.

The Jefferson, W. R. Grothen's Globe, Manasota, Homestead, Manalucie, and Manalee varieties [35, p. 402] are highly resistant to *Fusarium* spp.

'Crease-stem' is a physiological disease characterized by the appearance near the tip of the stem of a crease which deepens until a hole is formed. The ensuing malformation resembles a witches' broom. The cause is unknown but may be connected with temporary mineral deficiency. Grey wall, or internal browning [34, p. 406; 36, p. 138], causes considerable loss. It is believed to be a physiological disorder related to several environmental factors.

Pantidou (Maria E.) & Schroeder (W. T.). **The foliage susceptibility of some species of Cucurbitaceae to Tomato anthracnose-inciting fungi.**—*Plant Dis. Reptr*, 40, 5, pp. 432–436, 1 fig., 1956.

In inoculation tests in the greenhouse at the Department of Plant Pathology, New York State Agricultural Experiment Station, Geneva, varieties of cucumber, muskmelon, vegetable marrow (*Cucurbita pepo*), and squash (*C. maxima*) were susceptible to the following fungi causing anthracnose of tomato [cf. 27, p. 392]: *Colletotrichum* sp. (five isolates), *C. phomoides* (two), and *Glomerella cingulata* (one).

Tiny, whitish-brown specks to large, necrotic areas, according to variety and the fungus isolate used, developed on infected leaves, the number of lesions per leaf being independent of spore concentration. Spores produced on the lesions were infective to uninjured tomato fruits.

Similar experiments indicated that onion may serve as host for some of the isolates.

Waggoner (P. E.) & Dimond (A. E.). **Polyphenol oxidases and substrates in Potato and Tomato stems.**—*Phytopathology*, 46, 9, pp. 495–497, 1956.

At the Connecticut Agricultural Experiment Station the polyphenol oxidase systems of potato and tomato were studied in view of their part in the [unspecified] fungal wilt syndrome of both [cf. 33, p. 123]. Preparations from thick peel of Katahdin potatoes and stems of three-week-old Bonny Best tomato seedlings oxidized phenols having a second hydroxyl *ortho-* but not *meta-* or *para-* to the first, those from the former acting rapidly on tyrosine and those from the latter slowly.

The polyphenol oxidase substrate chlorogenic acid [36, p. 48] was readily detected in tomato leaves and potato tubers but did not appear to be present in the stems of either. Other substrates occurring in the stems were differentiated by R_f, fluorescence under ultra-violet light at 254 mμ, and the products formed with diazotized sulphanilic acid and with oxidase. They were, however, present only in small amounts, so that assuming the hypothesis that polyphenoloxidase is responsible for vascular discoloration to be correct [36, p. 68], this symptom must be induced by the liberation during pathogenesis of amounts, and possibly of kinds, of polyphenolic substances not normally encountered in potato or tomato stems.

Davis (D.) & Rothrock (J. W.). **Localized systemic activity of griseofulvin in the control of Alternaria blight of Tomato.**—*Plant Dis. Reptr*, 40, 4, pp. 328–331, 1956.

At the Merck Sharp and Dohme Research Laboratories, Rahway, New Jersey, griseofulvin (125, 250, 500, and 1,000 p.p.m.) [32, p. 491], applied as a localized, systemic agent, effectively controlled *Alternaria solani* on greenhouse tomatoes [35, pp. 244, 625], reducing the percentage necrotic area on inoculated leaves from 96 (untreated) to a range of 11 to 2. The antibiotic was sprayed on one side of the leaf, which was inoculated on the other side after 24 hours. Even when inoculated seven days after treatment the leaves developed considerably less infection (18 and 37 per cent. necrosis with 1,000 p.p.m. griseofulvin) than the untreated controls (60 and 93 per cent., inoculated on the upper and lower surfaces, respectively).

Applied as a foliage spray in the field, the practical advantages of griseofulvin over the conventional protectant fungicides are: less need for complete coverage, direct application to the lower surface of the leaves probably being unnecessary; less danger of wash-off and no need for immediate re-spraying when heavy rain occurs within 24 hours of application; and fewer sprays required with longer intervals between them.

Wilson (J. D.). **Comparative control of buckeye rot of Tomato by various fungicides.**—*Phytopathology*, 46, 9, pp. 511–512, 1956.

Buckeye rot of tomatoes (*Phytophthora* spp.) [cf. 20, p. 501] is of sporadic occurrence in Ohio, but caused economic losses in 1949 and 1955 even on staked plants. Of seven fungicides applied alone or in combination in trials at the Ohio Experiment Station, Wooster, on 12 varieties against anthracnose [*Colletotrichum phomoides*], 50 per cent. captan 50-W (3 lb. to 100 gals.) gave the best control of buckeye, followed by dithane M-22 (70 per cent. maneb at 2 lb. wettable powder), reducing diseased fruit from 31·3 per cent. in the unsprayed to 3·3 and 8, respectively. Zerlate alone (at 2 lb.) was poor, but with tribasic copper (1 plus 2 lb.) reduced diseased fruit to 10 per cent. On less susceptible varieties, such as Jubilee, Victor, and Sioux, there was less than 7 per cent. fruit damage compared with 12 to 15 on Jefferson, Bounty, and Pennhart.

Davis (D.) & Dimond (A. E.). **Site of disease resistance induced by plant-growth regulators in Tomato.**—*Phytopathology*, 46, 10, pp. 551–552, 1956.

At the Connecticut Agricultural Experiment Station, New Haven, the tops of

Bonny Best tomato plants at about the eight-leaf stage were dipped in a water solution of 10 p.p.m. 2,4-D, 50 p.p.m. α-naphthalene acetic acid, or 500 p.p.m. 3-indoleacetic acid [33, p. 122], and inoculated eight days later through the roots or cut ends of the stem with a suspension of *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* [31, p. 581]. One quarter of them were subjected to one of the following treatments, namely, (1) de-rooted eight days before inoculation (within an hour of applying the chemical) and kept free from roots after inoculation; (2) de-rooted as in (1) but rooted in sand after inoculation; (3) roots maintained prior to inoculation, but removed thereafter; and (4) roots left intact throughout. The de-rooted plants were grown in a nutrient solution. The plant growth regulators retarded wilting whether roots were present or absent either before or after inoculation. This indicates that these chemicals do not induce resistance to *Fusarium* wilt solely by producing changes in the root inimical to the pathogen, or by a resistance factor translocated from the roots to the tops or vice versa, but treatment of the top may cause changes in the roots as effective in checking disease as those produced in the tops [cf. 33, p. 691].

This study suggests that biochemical factors susceptible to change are present in the tops of wilt-susceptible tomato plants, and natural resistance may result from genetic factors that alter the metabolism of the tomato plant in a manner akin to that produced by growth regulating chemicals, the physiological changes produced by which should be investigated.

Conover (R. A.). **Comparison of fungicides for arresting established Tomato late blight infections.**—*Proc. Fla hort. Soc.*, 68 (*1955*), pp. 228–230, 1956.

In the 1955 tests at the Sub-Tropical Experiment Station, Homestead, Florida, on the spraying of Kokomo tomato plants against blight (*Phytophthora infestans*) [35, p. 494] the fungicides used were zineb (65 per cent.) at 2 lb. per 100 gals., maneb (70 per cent.) at 2 lb., dichlone (50 per cent.) 1 lb., nabam (19 per cent.) 2 qt.+0·75 lb. zinc sulphate or +1 lb. manganese sulphate, zineb (65 per cent.) 2 lb.+400 p.p.m. streptomycin, maneb (70 per cent.) 2 lb.+2 qt. nabam, and zineb (65 per cent.) 2 lb.+16 lb. sulphur. On 3rd September, 1955, there were 3, 1, 2, 1, 1, 1, 1, and 2 sporulating lesions per 10 leaves, as against 26 for the unsprayed.

None of the adjuvants increased the effectiveness of the fungicide to which it was added. As the number of lesions present during the first six days after the first application increased steadily in all treatments, it is apparent that the applications arrested the development of the disease by preventing new infections, and not by 'drying up' or killing the fungus in established lesions. It is concluded that once blight has appeared in a tomato field there is nothing to be gained by changing from one effective fungicide to another.

Puri (Y. N.). **Studies on Indian Poria.**—*J. Indian Bot. Soc.*, 35, 3, pp. 277–283, 1 pl., 5 figs., 1956.

In the course of a study of wood-rotting fungi at the Forest Research Institute, Dehra Dun, India, the author encountered five *Poria* species not previously recorded from India. These included *Poria xantha*, widespread on pine and oak, *P. corticola*, causing a white fibrous rot on a log of *Abies pindrow*, and *P. nigrescens* associated with a white rot of a log of *Quercus incana*.

The development of clamp connexions between monospore cultures of *P. callosa* and *Trametes serialis*, of which it is generally regarded as the resupinate form, is taken to confirm that they are the same species.

Domański (S.). **Studium nad grzybem Phellinus punctatus (Fr.) Pilát ze szczególnym uwzględnieniem jego rakotwórczej działalności na Jesionie.** [A study on the fungus *Phellinus punctatus* (Fr.) Pilát with special reference to its canker-

forming activity on Ash.]—*Acta Soc. Bot. Polon.*, 25, 1, pp. 159–180, 6 figs., 2 diags., 4 graphs, 1956. [English summary.]

In 1953 and 1954 the development of *Phellinus punctatus* [*Poria punctata*: 24, p. 169] was studied in a 43-year-old ash stand at Siemianice, Poznań, Poland. Observations indicated that the disease was chiefly confined to the lower parts of the tree, where it caused a yellowish-white rot of the heartwood, also attacked the living sapwood, and killed the cambium and bark, forming a canker. The annual rate of penetration of the fungus in the cambium, bark, and sapwood, above and below the point of origin, averaged between 2·4 and 2·7 cm., and in the heartwood 6·9 cm. above and 8·3 cm. below. The cankered areas were spindle-shaped, 0·34 to 2·71 m. long, always starting from a thin dead stub, and causing partial girdling. The formation of the canker, its course, and rate of development were dependent upon the individual resistance of trees to fungal penetration. A relationship was established between annual spread and long winter frosts, lower twigs killed in winter being probably a source of infection.

Anderson (R. L.). **Hypoxylon canker of Aspen.**—*For. Pest Leafl. U.S. Dep. Agric.* 6, 3 pp., 1 fig., 1956.

This useful pamphlet describes in popular terms the symptoms, life-cycle, distribution, and control of *Hypoxylon* canker (*H. pruinatum*) [36, p. 73] of aspens, which is particularly common in Michigan, Wisconsin, and Minnesota.

Holmes (F. W.). **Recorded Dutch Elm disease distribution in North America as of 1955.**—*Plant Dis. Reptr*, 40, 4, pp. 351–352, 1 map, 1956.

A map is given of the distribution of Dutch elm disease (*Graphium* [*Ceratostomella*] *ulmi*) [35, p. 853] in North America in 1955, prepared from pathologists' and entomologists' records for each town or county and from culture records at the Shade Tree Laboratories, University of Massachusetts, Amherst.

There are three, or possibly four, areas of infestation: the North-eastern Seaboard States, with a centre near New York; the St. Lawrence River Valley in southern Quebec and eastern Ontario; and the North Central States with a centre in Ohio, and possibly including the southernmost part of Ontario.

Campbell (W. A.) & Verrall (A. F.). **Fungus enemies of Hickory.**—*Hickory Task Force Rep. U.S. Dep. Agric.* 3, 8 pp., 2 figs., 1956.

The principal diseases of hickory and pecan in the United States [cf. 34, p. 759] are: leaf blotch (*Mycosphaerella dendroides*) [9, p. 751]; anthracnose (*Gnomonia caryae*); mildew (*Microstroma juglandis*) [9, p. 275]; scab (*Cladosporium effusum*) [35, p. 511 *et passim*], the greatest obstacle to pecan production in the South; bark cankers caused by *Nectria galligena* [23, p. 47], prevalent in the North and the Appalachians, and by *Strumella coryneoidea* [13, p. 406], reported from Pennsylvania and Maryland but not destructive; and trunk canker caused by *Poria spiculosa* [21, p. 270]. The latter is the most widespread and destructive hickory disease, being prevalent from Pennsylvania southward. Incidence is highest on pignut [*Carya glabra*] but occurs also on shagbark [*C. ovata*] and other species. A number of common wood-rotting fungi on hickory are listed. Bunch disease, due to a virus and causing witches' brooms, is of no importance.

Protection of logs and bolts is best effected by milling within one to two weeks after felling in summer and three months in winter. Otherwise, logs should be sprayed with a solution of 2 to 2·5 per cent. pentachlorophenol and 0·5 per cent. *gamma* BHC in a No. 2 fuel oil, or immersed in water and any exposed parts sprayed. Year-round dipping [cf. 29, p. 597] with a fungicide containing sodium pentachlorophenate or ethyl mercuric phosphate is recommended for protection of seasoning lumber, and as a standard treatment for wood that is to be exposed.

True (R. P.) & Tryon (E. H.). **Oak stem cankers initiated in the drought year 1953.** —*Phytopathology*, 46, 11, pp. 617–622, 5 figs., 3 graphs, 1956.

Single or multiple canker-like lesions, originating in the 1953 annual ring in the boles of young red oaks (*Quercus rubra*) [*Q.? falcata*] in West Virginia, were attributed, in the apparent absence of any causal organisms, to the severe drought of that summer. Twin trees, as opposed to single-stem trees, and those on shallow hill top soil were the most badly affected.

Parmeter (J. R.), Kuntz (J. E.), & Riker (A. J.). **Oak wilt development in Bur Oaks.**—*Phytopathology*, 46, 8, pp. 423–436, 8 figs., 1 diag., 1956.

Oak wilt development, host-pathogen relationships, and symptom expression in bur oaks (*Quercus macrocarpa*) inoculated with *Endoconidiophora fagacearum* [*Chalara quercina*] were investigated and compared with those occurring in pin oaks (*Q. ellipsoidalis*) in central Wisconsin [31, p. 522 *et passim*].

An improved method of inoculation was developed, in which small, waterproof paper pockets were fixed to the trunk over a chisel cut made into the sapwood and filled with a spore suspension. In bur oaks infection was generally limited to part of the circumference of the trunk and associated branches. Tyloses, obstructing the flow of water through the affected xylem, developed in the infected vessels of the outer annual ring two to five days before the appearance of foliar symptoms. Only those branches connected with the part of the trunk with plugged vascular tissue became wilted, and the trees were rarely killed during the first year of infection. Symptoms recurred in 1954 on 70 out of 130 (54 per cent.) of the bur oaks inoculated in 1953, owing to invasion of the new annual ring and subsequent vascular occlusion. Diseased trees with recurrent symptoms continued to lay down new annual rings yearly until the fungus had spread right through the crown, virtually girdling the tree with plugged vascular tissue. In trees that developed no symptoms following initial infection new rings, which did not become infected, were formed annually and ultimately buried the infection within the wood. Isolations from 35 such trees yielded *C. quercina* in three only.

The subcortical production of fruiting mats was not observed in bur oaks. Spread of infection from tree to tree was infrequent. Inoculation was more successful when performed on the trunk or root collar than through cut branches or roots. Incubation periods were prolonged in trees inoculated during dormancy or with small numbers of spores.

The important differences in the wilt syndrome in bur and pin oaks are attributed to the quicker spread of the fungus through the latter.

Curl (E. A.). **Experimental transmission of Endoconidiophora fagacearum by Collembola.**—*Plant Dis. Reptr*, 40, 5, pp. 455–458, 1956.

At the Section of Applied Botany and Plant Pathology, Illinois State Natural History Survey, Urbana, springtails (Collembola), caged on wounded trunks of healthy oak seedlings (*Quercus virginiana*) in the greenhouse after exposure for 24 hours to a source of conidia or conidia plus ascospores of *Endoconidiophora fagacearum* [*Chalara quercina*: 36, p. 71] were found to transmit the disease. There was no transmission, however, when a 16-hour interval elapsed between removal from the inoculum source and caging. This may be due to loss of viability of the spores or to loss of the spores themselves from the bodies of the active insects.

Because Collembola feed on fungi, are constantly found in large numbers on mycelial mats of *C. quercina*, are air-borne, and seek seclusion in crevices or wounds of living trees they must represent another group of vectors of oak wilt in nature.

Griswold (C. L.). **Transmission of the Oak wilt fungus by Pseudopithyophorus minutissimus (Zimm.).**—*J. econ. Ent.*, 49, 4, pp. 560–561, 1956.

From the Ohio Agricultural Experiment Station the author reports the trans-

mission of *Endoconidiophora fagacearum* [*Chalara quercina*] through half-an-hour's contact in the laboratory between the bark beetle *Pseudopityophthorus minutissimus* and a sporulating mat culture of the fungus [cf. 35, p. 853], followed by feeding on a healthy three-year-old red oak seedling. Wilt symptoms began to appear on 8th July, about a month after the beetles were placed on the tree, and on the 17th the fungus was found to be growing profusely on chips isolated from the stem and wood.

PARROT (A. G.). **Infection fongique d'une souche de Platane (Platanus acerifolia Willd.).** [Fungal infection of the stump of a Plane tree (*Platanus acerifolia* Willd.).]—*Bull. Soc. mycol. Fr.*, 72, 2, pp. 167–175, 1 fig., 1956.

On 19th April, 1942, the author observed *Xylaria polymorpha* growing on the damaged stump of a pollarded *Platanus acerifolia* tree near Bayonne. On 6th October, *Ganoderma lucidum* was also present. By 26th November *Armillaria mellea* had set up infection and *X. polymorpha* was regressing. By 15th November, 1943, *Hypholoma sublateritium* had appeared, and by 13th December, 1944, no trace of the original fungi remained, but *Pleurotus pinsitus* was found. By October, 1946, the stump had become covered with weeds and bore a carpophore of *Coriolus* [*Polystictus*] *versicolor*.

On 10th April, 1951, at Capbreton, Landes, the author noted the stump of another *Platanus acerifolia* tree which had been similarly pollarded. At shoulder-height it bore a vertical, lozenge-shaped wound measuring 44 by 17 cm. On 4th April, 1952, the wound was observed to be healing well. On 15th April, 1953, however, *Stereum hirsutum* and *Polystictus versicolor* were present. By 7th April, 1954, *P. versicolor* had spread considerably, but *S. hirsutum* was not observed. By the end of April, 1955, *P. versicolor* was growing rapidly and at the edges of the wound, where cicatrization callus had formed, *Auricularia mesenterica* had become established. On 12th April, 1956, the wound measured over 3·8 m. by nearly 40 cm. at its greatest width; *P. versicolor* had dried up, but *A. mesenterica* was spreading rapidly.

SCHÖNHAR (S.). **Braunfleckengrind und Rindentod der Pappel.** [Brown bark spotting and bark canker of Poplar.]—*Allg. Forstz.*, 11, 27–28, pp. 349, 352, 1 fig., 1956.

At the Forest Experiment Station, Stuttgart, in the spring of 1956, *Dothichiza populea* [see following abstracts] was isolated from 'brown spot scabs' on the cortex of poplars (*Populus robusta*, *P. bachelieri*, and *P. generosa* × *P. nigra*). The etiology of this disorder is unknown; it is characterized by local necroses on the stem or branches, the lesions being mostly irregularly delimited and ranging from 2 to 10 cm. in diameter. 'Brown spot scab' affects principally 10- to 25-year-old trees, but has also been observed on those of three years, *P. robusta* being particularly susceptible.

The results of these tests strongly suggest the existence of a relationship between *D. populea* and brown spotting. A noteworthy feature was the rarity of pycnidial production on stems and branches exceeding 5 cm. in diameter.

FRANKEN (E.). **Witterungsverlauf im Frühjahr 1955 und Pilzkrankheiten der Pappeln.** [Course of the weather in the spring of 1955 and fungus diseases of Poplars.]—*Holzzucht*, 9, 5, p. 30, 1956.

The large number (43) of 'critical frost days' (i.e., those on which the difference between the maximum and minimum temperatures was particularly great) during February, March, and April in the Hamburg district of Germany is regarded as a contributory factor in the 1955 epiphytotic of poplar bark canker (*Dothichiza* [*populea*: see preceding and next abstracts]). In the crucial month of March alone 26 such days occurred. Attention is further drawn to similar sequences in 1951 and 1952, when the numbers of 'critical frost days' from February to April were 48 and 40, respectively, and in March 22 each. These years may well have provided predisposing conditions for the 1955 outbreak.

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ERRATUM

Vol. XXXVI, page 4, line 30: *for* '0·1 to 0·2 per cent. streptomycin' *read* '0·01 to 0·02 per cent. streptomycin'.

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